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THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE

Founded by Henry E. Sigerist

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TABLE OF CONTENTS

PAGE

IN MEMORY OF HENRY E. SIGERIST

Four Addresses Delivered before a Special Meeting of The Johns Hopkins Medical History Club in Association with The Johns Hopkins Institute of the History of Medicine 295

MAIN ARTICLES

The Fountain of Life: A Greek Version: CHARLES TALBOT .. 1

Elizabeth Alkin *Alias* Parliament Joan: J. J. KEEVIL 17

Merrem's Youthful Dream: The Early History of Experimental Pylorectomy: OWSEI TEMKIN 29

The Development of the Concept of Cerebral Localization in the Nineteenth Century: A. EARL WALKER 99

James Mease, M. D., on the Diseases of Domestic Animals: J. F. SMITHCORS 122

The Medieval Medical University at Paris: VERN L. BULLOUGH 197

The Rheotome and Its Prehistory: A Study in the Historical Interrelation of Electrophysiology and Electromechanics: H. E. HOFF and L. A. GEDDES 212, 327

Maimonides on Medical Practice: JOSHUA O. LEIBOWITZ 309

Comments on Samuel Johnson's Biography of Sir Thomas Browne: MARY FRANCES WAGLEY and PHILIP F. WAGLEY 318

AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE: Twenty-Ninth Annual Meeting (cont'd.):

The William Osler Medal Essay: The Discovery of the Pulmonary Circulation: A New Approach: EDWARD D. COPPOLA 44

John Mitchell, Benjamin Rush, and Yellow Fever: SAUL JARCHO 132

Benjamin Franklin and the Rise of Free Treatment of the Poor by the Medical Profession of Philadelphia: ROBERT J. HUNTER 137

PAGE

Deborah Sampson, *alias* Robert Shirtliff, Fighting Female of the Continental Line: Wm. Frederick Norwood 147

The Famous Harrison Case and Its Repercussions: Linden F. Edwards 162

Charles E. Morgan's *Electro-Physiology and Therapeutics*: an Unknown English Version of du Bois-Reymond's *Thierische Elektricität*: Paul F. Cranefield 172

Jefferson on the Medical Theory and Practice of His Day: Courtney R. Hall 235

Calvin Jones (1775-1846). Some of his Contributions to Medical Practice in New York, North Carolina and Tennessee: S. R. Bruesch 246

Dramatic Presentations by Mental Patients in the Middle of the Nineteenth Century, and A. Dumas' Description: George Mora 260

Abstracts of Papers Read at the Twenty-Ninth Annual Meeting 278

American Association of the History of Medicine: Thirtieth Annual Meeting:

Report of the Thirtieth Annual Meeting, Richmond and Williamsburg, Virginia, May 6, 7 and 8, 1957: John B. Blake 348

SYMPOSIUM ON COLONIAL MEDICINE

IN COMMEMORATION OF THE 350TH ANNIVERSARY OF THE SETTLEMENT OF VIRGINIA

Sponsored jointly with The Medical College of Virginia Foundation

Jacobean England, 1603-1625: Sir George N. Clark 391

The Seventeenth Century English Medical Background: J. J. Keevil 408

Medicine in Sixteenth Century New Spain as Illustrated by the Writings of Bravo, Farfan, and Vargas Machuca: Saul Jarcho 425

Medical Practice in Colonial America: Whitfield J. Bell, Jr. 442

Epidemics, Real and Imaginary, and Other Factors Influencing Seventeenth Century Virginia's Population: Wyndham B. Blanton 454

PAGE

Edward Bell Krumbhaar: Physician, Historian, Founder of the American Association of the History of Medicine: Esmond R. Long 493

The William Osler Medal Essay: Elisha North: Experimentalist, Epidemiologist, Physician, 1771-1843: Sebastian R. Italia 505

Notes and Comments

An Introduction to Literature on the History of Gerontology: Gerald Gruman 78

A Passage in Vesalius' *Epitome* on the "Kings of Egypt": Joshua O. Leibowitz 84

Nature and the Libido: a Case of Semantic Continuity: William D. Sharpe 182

The Earliest Description of Paralysis Due to Multiple Neuritis following Diphtheria: Madelaine R. Brown 375

Bibliographies

Harvey Tercentenary: An Exhibition on the History of Cardiovascular Sound Including the Evolution of the Stethoscope: Victor A. McKusick, William D. Sharpe, and Allen O. Warner 463

Bibliography of the History of Medicine of the United States and Canada 1956: Genevieve Miller 537

The Johns Hopkins Institute of the History of Medicine:

Report of Its Activities: Richard Harrison Shryock 571

Medico-Historical News and Activities

Correspondence and Reports

Reports of the Fifteenth Congress of the International Society of the History of Medicine (Ralph H. Major)..... 87

Edward Hicks Hume 1876-1957 (Jean A. Curran) 575

Announcements 89, 186, 287, 376, 488, 577

Henry E. Sigerist (1891-1957) 91

Book Reviews 92, 188, 289, 379, 490, 582

Contributors to this Volume 98, 196, 294, 390, 492, 588

Index of Names 589

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CONTENTS

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NOTES AND COMMENTS

An Introduction to Literature on the History of Gerontology: GERALD GRUMAN 78

A Passage in Vesalius' *Epitome* on the "Kings of Egypt": JOSHUA O. LEIBOWITZ 84

MEDICO-HISTORICAL NEWS AND ACTIVITIES

Correspondence and Reports: Report of the Fifteenth Congress of the International Society of the History of Medicine (Ralph H. Major) 87

Announcements 89

Henry E. Sigerist (1891-1957) 91

BOOK REVIEWS 92

CONTRIBUTORS TO THIS NUMBER 98

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THE FOUNTAIN OF LIFE: A GREEK VERSION

CHARLES TALBOT *

In 1930 and 1931 the Wellcome Historical Medical Museum acquired a number of Greek icons from Athens and Istanbul, which appeared to have some religio-medical interest. At first it was conjectured that they represented an eastern form of the Fountain of Youth and, except for certain accessory details, provided no genuinely new material to amplify the already vast literature on this subject. For some years they lay hidden away among the enormous collection of pictures and other objects which Sir Henry Wellcome had systematically bought for his projected Historical Medical Museum and it was only recently that an opportunity occurred to subject them to closer inspection. It now transpires that the first hasty judgment on their position among representations of the Fountain of Youth was incorrect and that a completely different interpretation must be attached to them. In view of these new findings, it may not be without interest to give a brief outline of the story connected with the Fountain of Youth, show its ramifications and then compare it with the history and interpretation of the Greek version.

The idea of a miraculous fountain that restored youth to the old and health to the sick is undoubtedly of ancient origin. In his description of Greece, Pausanias speaks of a fountain in which Juno bathed to preserve

* Wellcome Historical Medical Museum, London.

her strength and vigour intact in order to appear beautiful to her husband. "And in Nauplia are a sanctuary of Poseidon, harbours and a spring called Canathus. Here, say the Argives, Hera bathes every year and recovers her maidenhood."[1] According to another tradition, Jupiter transformed the nymph Juventa into a fountain, whose waters possessed the powers of rejuvenation. This story was too marvellous not to appeal to the mind of the Middle Ages, and consequently it enjoyed a great vogue, gathering elaboration as it passed from one country to another. In mediæval literature the miraculous power of the fountain is such that it not only restores the lost bloom and vigour of youth, but also gives life. There are several versions of the story in old French poetry (in the *Dieu d'Amours*, for instance[2]), one of the simplest being that in *Huon de Bordeaux*:[3]

> Une fontaine, die-il, i cort par son canal
> De paradis vint li riu sans pausser,
> Il n'est nus hom qui de mère soit nez
> Qui tant soit viens ne quenus ne melles,
> Que, si il puet il riu ses mains laver,
> Que lues soit meschins et bracelers.. . .
> Dex ne fit feme tant ait fait ses delis
> Que s'elle boit de l'aige 1 seul petit,
> Ne soit pucele comme au jour que nasqui.

Developed with the addition of fantastic details, the story reappeared in the *Roman d'Alexandre*,[4] where there are three fountains mentioned, in the letter of Priester John,[5] and in the *Scala Coeli* of John Gobius, the fourteenth century Dominican. In the latter version, a king who is afflicted with an incurable malady discovers that he can find relief only

[1] Pausanias, *Description of Greece*, ed. W. H. S. Jones, Cambridge, Mass., 1918-35, II, 38, 2.

[2] *Le Fabel dou Dieu d'Amours*, ed. M. Jubinal, Paris, 1834.

[3] *Huon de Bordeaux, Chanson de geste*, ed. F. Guessard & C. Grandmaison, 1860; p. 165-6.

[4] *Roman d'Alexandre*, ed. P. Meyer, Paris, 1886, II, pp. 349-51; P. Meyer, *Alexandre le Grand dans la littérature française du moyen age*, II, p. 174; H. Vogelstein, *Adnotationes quaedam . . . ad fabulas quae de Alexandro circumferuntur*, Vratislavae 1865; H. Ethé, *Alexander's Zug zur Lebensquelle im Lande der Finsternis* (*Schriften d. Münchner Akad. d. Wissenschaften*), München, 1871. For oriental connections and sources of the Alexander material see I. Friedländer, *Die Chadhirlegende und der Alexanderroman*, Leipzig, 1913, and Th. Nöldeke, "Beiträge z. Geschichte des Alexanderromans," *Denkschrift d. Akad. d. Wissenschaft. Phil. Hist. Kl.*, XXXVIII, Wien, 1890.

[5] F. Zarncke, "Der Priester Joannes," *Sitzungsberichte d. Sächsisch. Akad. d. Wissenschaft.* VII, p. 878.

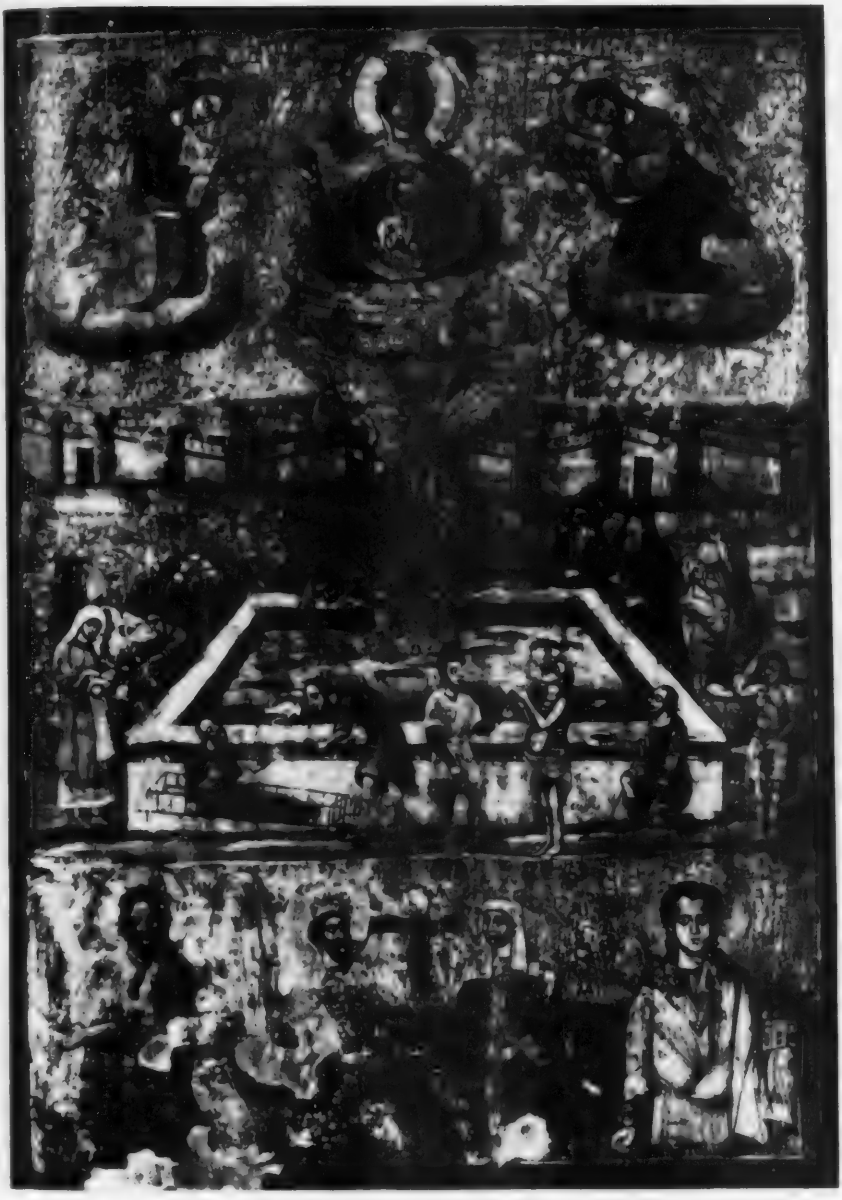

Fig. 1. A 17th century icon showing the fountain, with the various personages mentioned in the liturgy for the feast of Zoodochos Pege and the miracles performed there. Below, figures of Saint John Baptist, the Emperor Constantine, Saint Helena and another saint, probably the patron of the church to which the icon belonged. The bad condition of this icon in the lower panel is most probably due to pilgrims detaching small portions of the surface and taking them home to be used later as remedies for various illnesses. (Well. Coll. P 1370/1938)

in the health-giving waters which are inaccessible to mortals. His youngest son sets out to find them and, after overcoming many obstacles and passing through great adventures, obtains the water, cures his father and marries a beautiful damsel.[6]

It is only natural that such a story should have found great favour among the courtly circles of France and Germany and that artists who worked under their patronage should have employed it as a common theme for representation in manuscripts,[7] on ivories,[8] and at a later period, in tapestries.[9] In these representations we seen men and women bathing beneath a tree on which birds are singing in an idyllic atmosphere of peace and contentment. On one side are the old and decrepit being borne along in conveyances to the place of rejuvenation: they bathe in the fountain or drink the water, emerging on the other side beautiful, lithe, and happy, to resume once more their gay and carefree life in an embattled castle.

The fourteenth and fifteenth centuries saw the belief in this fountain that removed all ills and smoothed out the wrinkles of age reach its apogee, and so deep was the conviction that such a source of life existed in reality that Ponce-de-Leon, the Spanish explorer, set out to discover its locality. Fired by reports which he had received from native Indians, he obtained a patent from Charles V, 23 February, 1512, to organize an expedition to an island called Bimini, which lay north of Hispaniola, with the idea of annexing the fountain and colonising the territory. He set out with three ships on March 3 of the following year and after sailing in a north-westerly direction came in sight of a coast which he called, after the day on which it was discovered, Florida (Pascua de Flores). Needless to say,

[6] Other variants will be found in I. I. Crane, "Two medieval folk tales," *Germania*, 1885, p. 203; A. L. Grimm, *Kinder und Hausmärchen*, Göttingen, 1856, III, p. 176; Hans Sachs, *Sämtliche Fabeln und Schwänke*, Halle, 1903, IV, pp. 483-4; F. H. Von der Hagen & J. G. Büsching, *Wigamur, Deutsche Gedichte des Mittelalters*, Berlin, 1808, I, 483.

[7] E. g. Bibliothèque Nationale, Ms. français 146, col. 42[v]; E. Mâle, *L'art religieux de la fin du moyen âge*, Paris, 1908, p. 112 ff.; M. Geisberg, *Bilderkatalog*, 1930, p. 59, nos. 263-266, p. 270, nos. 1584-5.

[8] R. Koechlin, *Les ivoires gothiques français*, I, p. 396-8, pls. 182, 193, 196, 199, 218; P. d'Ancona, *L' Uomo e le sue opere nelle figurazioni italiane del Medioevo*, Firenze, 1923, pp. 25-32.

[9] B. Kurth, *Deutsche Bildteppiche d. Mittelalters*, 1926, II, pl. 124; H. Göbel, Wandteppiche, I, p. 91; Guiffrey, *Histoire général de la tapisserie*, p. 40; L. Van Marle, "Iconographie de la décoration profane des demeures principières en France et en Italie," *Gazette des Beaux Arts*, 5[e] série, XIV, 1926, p. 175; I. von Schlosser, "Ein Veronesisches Bilderbuch und die höfische Kunst des XIV. Jahrhundert," *Jahrbuch d. Kunsthist. Samml. d. Allerh. Kaiserh.* XVI.

Fig. 2. Icon, 18th-19th century. The fountain is cruciform. Below, figures of Saint Demetrios, Saint John Baptist, Saint Nicholas and Saint George. No indication of provenance. (Well. Coll. P 1374/1938)

he failed to find the object of his quest, and on a later expedition was attacked by the natives, wounded, and died at Cuba of his wounds.[10]

Though the belief in a fabulous spring was slow to die, it fostered and encouraged the use of baths,[11] and though the results may have fallen far short of the fantastic expectations of the sick and the aged, there can be little doubt that it encouraged hygiene, with its consequent improvement of public health, and the emergence of the popular mineral baths and spas. In this sense the restorative properties of water were duly acknowledged, and the original story found its justification.

Side by side with the secular idea of the miraculous spring there was the religious counterpart, the Fount of Life. The sources for this concept were already latent in the Old Testament, but with the early Christian insistence on the figurative meaning of the ancient prophetic texts and the application to Christ of certain phrases which spoke of "fountains of living waters" and similar things, the idea of Christ as the Fount of Life soon took root and developed. At first the representation of the Fount was but a single element in the larger image of paradise, where beasts and birds, gardens and streams, showed the abundance, fertility, and peace of man's original and final resting place.[12] But when the early Christians began to consider, and to express in funereal inscriptions, paradise as a place of refreshment, *locus refrigerii*,[13] the single element of the stream and water gushing from a rock or hill crystallized for them all the beauty, power, and vigour of the new-found life beyond the grave.[14] The earliest representations show sheep drinking the water of life from a kind of ornamented vessel, later from streams which flow from the hill of paradise, later still as peacocks, the symbol of immortality, sipping from classic vases. The gradual development of this theme can be traced throughout the many surviving illustrated manuscripts of the Carolingian period, where its place is found invariably at the end of the Canon Tables.[15] Before the end of the eleventh century it found a place on the famous doors

F. A. Ober, *Ponce de Léon*, New York, 1908; J. Windsor, "The track of Ponce de Léon," *American Geog. Soc. Bulletin*, XLV, 1913, pp. 721-35.

[11] K. Weinhold, *Die Verehrung der Quellen in Deutschland*, Berlin, 1898; A. Martin, *Deutsches Badewesen in vergangenen Tagen*, Jena, 1906, p. 222; L. Masson, "La fontaine de jouvence," *Aesculape*, 1937, pp. 244-51, 1938, pp. 16-23.

[12] W. A. v. Reybekiel, *Fons Vitae*, Diss. Bremen, 1934, p. 6 ff.

[13] C. M. Kaufmann, *Sepulkrale Jenseitsdenkmäler*, Mainz, 1900, p. 54.

[14] E. Hennecke, *Altchristliche Malerei*, Leipzig, 1896, p. 214.

[15] A. Goldschmidt, *Deutsche Buchmalerei*, I, München, 1928, pls. 28, 34; A. Bockler, *Deutsche Buchmalerei Vorgothischer Zeit*, Königstein, 1953, p. 15; C. Nordenfalk, *Die spätantiken Kanontafeln*, Göteborg, 1938, p. 8.

Fig. 3. Icon, 19th century, from Istanbul. The background probably represents Constantinople with the Emperor Leo being led from the Porta Constantini to the fountain of Balukli. Below, Saint Nicholas, the Emperor Constantine, Saint Helena and Saint Charalampias.

of the cathedral at Salerno.[16] In most of these scenes no human figures are visible; the only living creatures are the birds and the beasts. But in the Utrecht Psalter,[17] which was written at the beginning of the ninth century, groups of people are represented carrying buckets and drawing water from the stream which issues from the hill, whilst in the four corners of the page men and women are seen drinking it. The symbolism, however, is always the same: Christ is the Fountain of Life, and whoever drinks from it, whether in baptism or in the other sacraments, will receive the reward of immortality.

The gradual development of theology and the rise of various devotions towards the person of Christ during the later Middle Ages brought about a corresponding elaboration of this simple original idea and the illustrations in manuscripts now begin to show not merely a stream of water pouring down a hillside, but a fountain with four compartments arranged in the form of a cross. From the middle of the fountain rises a crucifix, flanked by two angels, and the people, no longer drinking the living waters as hitherto, climb in and out of the fountain, cleansed and regenerated by their experience.[18] No distinction is made between the various personages who are present, and the picture is evidently meant to convey that all alike may benefit from contact with the water of grace and redemption.

With the bringing back of relics from the East during the Crusades, a new devotion originated, directed to the Precious Blood, which rapidly spread throughout France, Italy, Germany, and England. A confraternity was started at Bruges,[19] dedicated to the fostering of this devotion, and soon pilgrimages were set on foot to those centres, like Hayles in England and Anchin in France, which were supposed to possess relics of the Blood. Besides the hymns and liturgical poems which were written to express the belief in the redemptive and purifying power of the Blood of Christ, pictures, stained-glass windows, and manuscripts portrayed Christ as the Fountain of Life, with his five wounds pouring blood into a cruciform bath where Christians could be spiritually renewed. The hymn in the Roman Breviary makes obvious this aspect of the devotion:

> Venite quotquot criminum
> Funesta labes inficit:
> In hoc salutis *baluco*
> Qui se lavat mundabitur.

[16] A. Boeckler, *loc. cit.*, p. 77. [17] Fol. 83v. [18] Examples in E. Mâle, *loc. cit.* p. 112 ff.
[19] *Loc. cit.* p. 104; E. Underhill, "The fountain of life," *Burlington Magazine*, XVII, 1910, pp. 99-109.

Fig. 4. Silver cover of the icon reproduced in Fig. 3, 19th century, fixed, probably, to prevent the depredation visible in Fig. 1. (Well. Coll. P 1372/1938)

Unfortunately it is not possible to give a definitive date to this composition.[20] But another hymn, published by Dreves,[21] stems from the fifteenth century; it has the following passage: :

> Sanguis, animarum lavacrum, lava nos.
> Sanguis, piscina languentium, salva nos.
> Sanguis, fons puritatis, irriga nos.

A picture at the Misericordia in Oporto, Portugal,[22] represents Christ on the Cross, which rises out of the fountain, with Our Lady on the right, Saint John on the left, and various men and bishops grouped about the fountain. A rather more developed elaboration of the theme is found in a window at Vendome[23] where the four evangelists are seated on the edge of the fountain together with Saints Peter and Paul. The Precious Blood flows to Adam and Eve who are in the piscina, and thence below to the Pope and all the members of the Christian Church. Somewhat later, in a picture painted by Lucas Horenbault in 1596 for the church of the Petit Béguinage at Ghent,[24] we see the Trinity enthroned and adored by angels, the Father and Son side by side and the Blood flowing from Christ's wounds into an upper basin which is inscribed *Fonteyne des Leevens*, The Fountain of Life. From this it falls into a lower basin, called the Fountain of Mercy, whence it streams out through a series of mouths in the sides to the whole Church. On the left stand the Christian saints and martyrs, headed by Our Lady, on the right are the Patriarchs and prophets, headed by Saint John the Baptist, and below them stands a crowd of men and women, religious and secular, headed by the Pope. This then is the final culmination of the theme of Christ as the Fountain of Life, the source of regeneration, the bath of purification. The many other representations of the same subject by artists of the sixteenth century have nothing to add to it, and from this period onwards a decline in the popularity of the subject sets in.

What is interesting in all these pictures is that the dogmatic and theological content is uppermost in the minds of the artists concerned. The personages who are grouped about the main subject are there, not in their own right, but as representatives of a class of people; the whole concept is symbolic from beginning to end. What is more surprising still is that no reference is made, or even implied, to purely physical sicknesses.

[20] J. F. Bergier, *Étude sur les hymnes du Bréviaire Roman*, Besançon, 1884.
[21] G. M. Dreves, *Analecta hymnica*, IV, p. 21.
[22] Reproduced in Mâle, *loc. cit.* fig. 44.
[23] *Loc. cit.*, fig. 45.
[24] E. Underhill, *loc. cit.*

Fig. 5. Icon, 19th century. Below, Saint Nicholas and Saint Charalampias. (Well. Coll. P 1371/1938)

Whereas the corresponding secular depictions of the theme of the Fountain of Life had emphasized the complete physical rehabilitation of the aged and the infirm, the religious pictures concentrate solely on the spiritual benefits to be acquired by contact with Christ. There was, therefore, no definitely historical or real value behind the subjects depicted and the theme remained suspended in the realm of ideas.

One interesting divergence in the representation of this theme of the Fountain of Life is to be found among the artists originating in Germany and the Low Countries. This takes the form of substituting Our Lady and the Child for Christ. In the royal palace at Lisbon there was a picture, presumed to be by Holbein and dated 1519,[25] which showed the Madonna with the child in her arms, seated before a triumphal arch, flanked by royal personages and having at her feet a fountain in which fishes can be seen swimming. The title of the picture is The Fountain of Life. Other representations of the same subject and in the same manner have also been recorded;[26] but it was not a popular form in Europe and perhaps less than six examples of it are known.

Though the idea of the Fountain of Life originated in the East and was first propagated by a Greek, it does not appear to have given rise there to any of the representations to which we have become accustomed in the West. It may appear strange that a theme which has been the source of so much literature and has provided a stimulus for so many artists in the West should have been sterile in the place of its origin. Stranger is it still that the religious aspect of the subject, which is based upon the references in the scriptures to Christ as *Fons Vitae* and which has proved so fertile a source of inspiration to Christian artists, whether working in the catacombs or on imperial mosaics, or in the stained glass and manuscripts of the medieval cathedrals, should have found no echo in the places under Byzantine influence. But so it is. Throughout the liturgy of the Greek Church the phrase "Fountain of Life" is applied not to Christ, but to the Blessed Virgin.[27] The examples of this are too numerous to mention, but it should perhaps be pointed out that even as early as the sixth century the celebrated hymn writer, Romanos, was addressing the Virgin as Fountain of Life and Fountain of Immortality.[28] Whether this infiltrated

[25] A. Seemann, "Der Brunnen des Lebens von Hans Holbein," *Zeitschrift f. bild. Kunst*, XIV, 1903, pp. 197-206. On this general theme, see W. A. v. Reybekiel, *Fons Vitae*, pp. 30-33.

[26] E. g. by Memling, Gerard David, Hans Daucher.

[27] E. g. Sunday Canon, *Katabasis* 3.

[28] Akáthistos hymn in *Mega Orologion*, recapitulation 3.

into the Byzantine liturgy through the agency of the Copts[29] it is now impossible to determine, but the fact is that throughout the East this particular interpretation of the phrase is general.

So popular is this devotion to the Virgin as the Fountain of Life that on the Friday following Easter Sunday there is a special feast for *Zoodochos Pege* assigned in the liturgical books. If we examine this liturgy one prominent factor emerges: the whole feast and devotion is intimately connected with the monastery of Balukli, near Constantinople. This monastery and shrine were built, so we are told by Nicephoros Callistos Xanthopoulos, a fourteenth century historian, by the Emperor Leo.[30] The story goes that whilst Leo was walking, one day, along the road, he met a blind man who asked him for water to slake his thirst. As he was invariably kind to the poor and infirm, he took the blind man by the hand and offered to lead him to a spring in the vicinity, but after wandering about for a long time and finding nothing, he grew despondent. At that moment a voice came from heaven directing him to the spot where a stream bubbled from the earth, it prophesied that he would become Emperor and commanded him to build a shrine where the water flowed. After they had slaked their thirst at the spring, the blind man bathed his face in the water, and his sight was restored. A further promise came from heaven that no sinister power, whether it be the devil or a disease, especially a disease that would not yield to medical treatment, would be able to resist the properties of these healing waters, provided suitable prayers were offered. When Leo eventually attained the imperial throne, he built the shrine as he had been commanded, and wonderful cures and miracles attested to the sanctity of the spot. Some time later when the buildings had been partly ruined by an earthquake, they were repaired and greatly enlarged by the Emperor Justinian and his wife Theodora, but between that date and the beginning of the twelfth century, when charters were drawn up in its favour, the shrine of Balukli seems to have lost some of its former glory.[31] The buildings were described in detail by Nicephoros in the fourteenth century[32] and the cures which took place there were recorded by him in a separate book.[33]

[29] This theory is put forward by Johann Georg, *Byzantinische Zeitschrift*, 18, 1909, p. 183.

[30] Nicephorus Callistus Xanthopoulus, *Ecclesiasticae Historiae*, ed. J. Lange et F. Du Duc, Paris, 1630, lib. XV, c. xxv, pp. 626-8.

[31] Eugenios, *He Zoodochos pege kai ta hiera autes prosartemata*, Athens, 1886, pp. 228-31.

[32] *Loc. cit.* pp. 628-30. The description is too lengthy to be included here, but should prove of great interest to art historians.

[33] The book was published at Athens in 1802, but I have been unable to consult a copy of it.

One legend, which has become attached to the place and which has a bearing on the icons which we shall describe in a moment, is connected with the capture of Constantinople by the Turks in 1453.[34] It is related that some time before the city was attacked, a monk of the monastery was cooking fish when, suddenly, he heard a voice telling him that Constantinople would be plundered. The news seemed so incredible that he told himself it was impossible and quite as unlikely as that the fish which he was frying would live again. At that moment, the fish sprang out of the pan and convinced him of his error. In the crypt of the church in which the miraculous spring is situated, the offspring of these fish are still shown to the visitor and their brown-coloured backs are pointed out as evidence of the narrow escape of their ancestors.[35]

It is quite obvious that the fame of such a shrine and the report of its cures would soon provide material for artists, and as a result we have a number of icons depicting Our Lady as the Fountain of Life.[36] As in the pictures of the West, the fountain rises from a cruciform basin, above which the Madonna and Child, flanked by the archangels Michael and Gabriel, sit enthroned and send down the life giving waters which will regenerate and purify the bystanders. Round about the fountain, as in the Western representations of the subject, are grouped members of the whole church militant, the patriarch, archbishop, bishop, and monks on one side, the Emperor with his court, soldiers, and people on the other. In the background may be seen a soldier leading a blind man, in the foreground sufferers from various diseases, who are having the water poured over them. All this may lead one to surmise that we are dealing with a simple variation of the usual Western theme.

This, however, is not the case.[37] In the first place, the soldier leading the blind man is Leo himself, the founder and builder of the shrine. The patriarchs are Stephen and John, one of whom was cured at the shrine of chronic debility, the other of deafness. The monks are Peperin and his

[34] The story is recorded by J. Georg, *Byzantinische Zeitschrift*, 18, 1909, p. 183. There is another version in A. Passow, *Tragoudia Romauka: Carmina popularia Graeciae recentioris*, Lipsiae, 1860, p. 147, in which a nun cooks the fish.

[35] J. Georg, *loc. cit.*, thinks that the representation of the fishes swimming in the fountain is more recent than the legend. In the South of Greece they are not represented at all, though they appear in a copper engraving from Mount Athos.

[36] V. Muñoz, *L'art Byzantin à l'exposition de Grottaferrata*, Rome, 1906, p. 59; A. N. Didron, "La mère et l'enfant," *Annales Archéologiques*, 1884, p. 560.

[37] Benay, "Le monastère de la Source," *Echos d'Orient*, III, 1899-1900, p. 223 ff. and 295 ff. points out that all the miracles which are mentioned in the liturgy for the feast of the Dormition of the Virgin and Zoodochos Pege are represented in the icons. The latter feast occurs in the *Pentecostarion* on the Friday following Easter Sunday.

master Matthew and another monk named Meletios, all of whom were miraculously relieved of their diseases. The Emperor is Leo, who was cured of stone, the Empress, his wife, who was cured of severe fever, the woman with the child is also a real, not a representative, person. In fact, the liturgy of the feast of Zoodochos Pege mentions by name all the miracles which are found depicted in the icon. This makes the Greek version of the Fountain of Life much more historical and real than the symbolic, theological, and dogmatic representations of the West.

Though the sufferers from various diseases who figure in the foreground of the icons are not portrayed as identifiable persons, it is quite obvious from the liturgy that they are taken as single instances of cures effected on a large scale. The man from whom the devil is being cast is undoubtedly one of the psychological cases mentioned in the final paragraph of the liturgy, as is also the paralytic, and the lame man suffering from some form of leprosy.

It will be noticed also that in the Greek icons, the fountain is always shown as being outside the walls of some great city. The original shrine at Balukli was situated at some distance from the walls of Constantinople and was therefore meant to convey a true picture of a real fountain in a particular locality; it is not an imaginary landscape intended to fill out the background. This is of some importance both for the dating of the icons and for their geographical position. Not all the buildings in the background of these representations are the same, and though some undoubtedly show the original shrine with the walls of Constantinople behind, there are others which have monasteries of Nicaea, Porios, Nauplia, and so on.[38] It is not my purpose to identify these places at the present time, but the figures of the patron saints in the lower panels of the icons are the safest clues for providing an answer.

In connection with this localisation of the icons of Zoodochos Pege, it should be mentioned that there were several monasteries and shrines dedicated to the Virgin under this name and curiously enough one of them is situated in Nauplia.[39] It will be recalled that Pausanias in recording the story of the original Fountain of Youth placed it in Nauplia, and Frazer, in his commentary on this passage says: "There seems to be no spring in Nauplia at the present day . . . But the spring in question has

[38] For the other monasteries dedicated to the Virgin, Fountain of Life, see *Byzantinische Zeitschrift*, IX, 1900, p. 550; X, 1901, p. 479; XII, 1903, p. 718; K. Krumbacher, *Geschichte d. Byzantinischen Literatur*, 2 ed. p. 153. The monastery in Poros in the Peloponnesus has been described by E. Drakos, "Monai Hellenikai," *Hieros Sundesmos*, V, 1899, p. 152-4.

[39] *Byzant. Zeitschrift*, IX, 1900, p. 550; XII, 1903, p. 718.

been identified with a fantastically ornamented fountain in the shady garden of a little nunnery called Hagia Moné, about a mile and a half east of the suburb of Pronia."[40] This is one of the nunneries which has a shrine dedicated to The Fountain of Life.

The interest in the Wellcome collection of these icons arises from the fact that, except for two in Italy (Venice and Cattaro)[41] neither of which has an architectural background, one in Poland at Kielce and another at Novgorod in Russia,[42] these are the only examples of the Greek Fountain of Life outside Greece.[43] They bring a fascinating glimpse of the oriental attitude towards this age long tradition, showing that though the Greeks originated the idea, they were much slower in taking it up and developing it, and when they did so, followed it along realistic lines, combining two divergent modes of expression, the religious and the secular, the spiritual and the physical, the historical and the legendary.

[40] J. G. Frazer, *Pausanias' description of Greece*, London, 1898, III, p. 304-5.

[41] J. Georg, *loc. cit.*

[42] G. Laskin, *Vizantiyskiy Vremennik*, III, 1896, pp. 337-8; these seem to be later than the Wellcome Museum examples. See also, A. N. Muraniev, *Rimskiya pisma*, III, pp. 28-9; *id. Gruziya i Armeniya*, II, pp. 323-4; cf. *Russkie Drevnosti v pamyatkakh iskusstvia, Tolstogo i Kondakova*, IV, p. 75.

[43] Georg dates the Venice Icon as being *circa* 1600; the others are much later and may belong to the period after 1834, when Balukei came into prominence again.

ELIZABETH ALKIN *ALIAS* PARLIAMENT JOAN

J. J. KEEVIL

Since the dissolution of the monasteries and the consequent closing of the houses of pity, there had been no place in England where women with a vocation for nursing could pass their lives, and with this had come a change in the status of those who ministered to the sick. When the hospitals in London were refounded, the nursing was provided by women drawn, not from established families and merchant houses, but from the courts and alleys of Smithfield and Southwark.

The revolutionary social changes caused by the civil war, and the widespread character of the fighting between 1642 and 1651, led matrons and girls of all classes to accept the home nursing of wounded and disabled men as a patriotic duty: there is, for example, the case of Hester Whyte. Mrs. Whyte nursed the Parliament soldiers wounded at Edgehill, "who continued at her house in great misery (by reason of their wounds) for three months." She was often up night and day with them, and spent her money freely in their care. Such incidents must have been frequent, and indeed so commonplace as to escape record except when the facts were mentioned in another context. In Mrs. Whyte's case they occur in a petition[1] to the Committee of Safety for Warwick and Coventry in April, 1646, by which time she herself was "destitute and comfortless"; her husband had been killed in the service of the Parliament at the siege of Banbury castle in 1644.

The response of such women to the demands of war resulted, however, in no enduring change in the attitude towards nursing in the public hospitals dedicated to the care of the very poor. Happily for the wounded in the first Dutch war, 1652-53, some of the women who had nursed in the field from Edgehill to Worcester, were still ready to respond to the new urgent call, so that we find the Savoy Hospital, and presumably Ely House too, staffed by women of some standing, when these hospitals were taken over by the state for the use of the wounded. These women were also to be found nursing in the accommodation improvised for seamen at the coastal towns, if that remarkable personality, Elizabeth Alkin, can be regarded as representative.

During the civil war Mrs. Alkin's husband was denounced by Stephen Fossett, surgeon to Sir Arthur Ashton, and hanged by the royalists at

[1] *State Papers Domestic*, DXXXIX/358, April 22, 1646.

Oxford.[2] Since the reason for Alkin's execution was later given as his "doing service to the State," it is probable that he was a spy. Meanwhile, Mrs. Alkin "day and night hazarded her life, and was from time to time a great help to the distressed, imprisoned, and maimed soldiers by relieving them."[3] The conjunction of these two statements has sometimes led to the assumption that she risked her life in the cause of nursing, but a number of circumstances support a different interpretation. It should be noted that this expression of gratitude comes not from cavalier but roundhead sources, and must refer to roundhead prisoners and wounded held by the royalists. Mrs. Alkin was in fact working among the men who had condemned her husband to death, and was indeed daily hazarding her life for she was a spy.

The name "Parliament Joan," or simply "Joan," appears not infrequently on state papers[4] as an endorsement, or in other forms, where these documents refer to Mrs. Alkin, and the view has been expressed[5, 6] that this was an affectionate nickname, given to her by grateful cavalier wounded whom she nursed when they were prisoners of the roundheads. There appears to me, however, no good reason for so marking state papers, and the more probable explanation is that the endorsement was intended to relate these papers, which were appeals by Mrs. Alkin for money, to others in which the name "Parliament Joan" alone appears and where the services are listed which might constitute a claim on the generosity of the roundheads now in power. Very occasionally, when writing to some roundhead official, Mrs. Alkin in later life would sign herself "Elizabeth Alkin alias Joane," as if to remind him of her past, and once, when the question of rewarding her came up for discussion in the House of Commons, a reference was made to her under this alias. That the clerk, when reporting the debate, wrote[7] "alias Jones" is itself an indication that she was not popularly known as "Parliament Joan," and that this was in fact a code name. No files containing this name alone now exist, but highly secret documents rarely survive, and these would have dealt with Mrs. Alkin's work as a secret agent on behalf of the Parliamentary generals, the Earl of Essex, Sir William Waller, and Lord Fairfax.

[2] *Calendar of the Proceedings of the Committee for Compounding*, 1643-60, p. 1597.
[3] *State Papers Domestic*, xxxiii/81, February 22, 1653.
[4] *State Papers Domestic*, xxxviii/5, July 2, 1653.
[5] Manwaring, G. E., *United Services Mag.*, 1918, *N. S. 57*, 301-10.
[6] Macdonald, I., *Elizabethan Alkin, A Florence Nightingale of the Commonwealth*, Royal College of Nursing, London, 1934.
[7] *Common's Journal*, *5*, 334; October 15, 1647.

We only know of her work for them at this time because she petitioned,[8] in September, 1647, for payment for these services, performed "to the hazard of her life," and reminded the government that "her husband was hanged in Oxford by the late king's party." She asked for £40 and stated that she was likely to be cast into prison for debt. The immediate cause for this petition was that she had but recently "done good service in discovering printers and publishers of scandalous books," which had led to the accused men being committed to Newgate. The value of these services can be estimated from the sum claimed, which would have kept her in comfort for a year, even allowing for the rising cost of living. Prior to this an order had been sent to the Committee for the Advance of Money on March 7, 1645, to pay her £2 "for several discoveries," [9] and again a week later "for discovering Geo Mynne's wire," Mynne having been supplying the royalists with guns, ammunition, and other weapons.

On December 12, 1646, she was gven "£50 for her relief on an order of the House of Commons of 4 December last," [10] and at this date she was living in, or receiving the rent of, a house which had belonged to Fossett and had been sequestered.[11] In January, 1647, he claimed to have compounded for it and entered actions against Mrs. Alkin to imprison her. It was now, as we have seen, that she petitioned for more recognition of her past services and her position as the widow of a good roundhead. The Council of State sent on her appeal to Parliament, and on October 15, 1647, the House ordered [12] that £50 be "paid unto her forthwith by the Committee for Sequestration at Campden House," who were also to provide her immediately with "a convenient House . . . to dwell in." In November, the County Committee for London gave her the profits of a house and warehouse sequestered from Captain Rawdon, and on June 18, 1650, we find Mrs. Alkin successfully petitioning for the retention of these, when an attempt was made to dispose of the property. Once more she mentioned her services and those of her late husband to the state.[13]

In the intervening years Mrs. Alkin had not been inactive; her

[8] *Calendar of the Proceedings of the Committee for Advance of Money*, 1642-56, pp. 517-8.

[9] *Op. cit.*, 517.

[10] *Calendar of the Proceedings of the Committee for Compounding*, 1643-60, p. 1597.

[11] *Ibid.*

[12] *Ibid.*, and *Commons' Journal*, 5, 334.

[13] *Calendar of the Proceedings of the Committee for Compounding*, 1643-60, p. 1597.

name was repeatedly before the numberless committees among which the authority of the government was now divided, and they could still afford to be generous with the revenues available from the former royal estates from ecclesiastical property, and from that confiscated from individuals who had fought on the losing side. On June 2, 1649, following further petitions from Mrs. Alkin, the Commons directed the Council of State to grant her money, and a house for life.[14] In March, 1650, the Council recommended that she should have " either the slaughter-house belonging to the late king, or some other of equal value," [15] presumably as a source of income. In November, 1651, she received £10 for good service [16] in discovering the source of the book, *Manus Testium, Lingua Testium,* with a further £3.8.0 for her expenses during her search.[17] On February 4, 1652, she received £10 without any stated reason,[18] and that April the Council gave her a further £10 " for good service "; [19] on November 11, another £5 " for good services to the public " were voted to her.[20]

The battle of Worcester, fought on September 3, 1651, marked the end of militant royalist resistance on land, and it is significant that the payment made to Mrs. Alkin in the following April was accompanied by a warning that she should expect no more " in this kind." If an exception was made seven months later, yet the warning was no empty one. " Parliament Joan " was no longer required, and with the disappearance of this sinister figure, a very different one emerges from the shadows, so different indeed that it is difficult to reconcile the two. " Parliament Joan " may have felt it a duty to continue the work for which her husband was hanged, or she may have wished to avenge his death, or she may have needed the money with which she was so handsomely rewarded, but whatever her motives she must have cold-bloodedly lured many men to their destruction. These denunciations are in conflict with the compassionate and generous nature to which the later records of Elizabeth Alkin always testify.

To our admiration for these aspects of her character can be added sympathy for her waning fortunes. Once she ceased to produce information and to expose politically unreliable people, the authorities ceased

[14] *State Papers Domestic* ii/1, June 2, 1649, and *Common's Journal*, 6, 222.
[15] *State Papers Domestic* ix/12, March 7, 1650.
[16] *State Papers Domestic* xvi/115, November 28, 1651.
[17] *State Papers Domestic* xvi/115, November 29, 1651.
[18] *Calendar of State Papers Domestic* (1651-52), 590.
[19] *State Papers Domestic* xxiv/8, April 28, 1652.
[20] *Calendar of State Papers Domestic* (1651-52), 620.

to be interested in her. The first taste of adversity came on September 29, 1652, when Captain Rawdon's house was at length sold, and she lost its rent.[21] She found and applied for another, which had belonged to Sir Richard Lichford, delinquent, but this was not granted as being of too great value: only one worth £7 a year was approved as a source of income for her; a house for her to dwell in was never found. Administrative expansion had led to much private property being used for offices, many committees and commissions had to be accommodated. In the end she was given lodging in one of that maze of old buildings, which King Charles I had intended to rebuild, with the help of Inigo Jones, on the scale of the Louvre. Until April, 1654, Elizabeth Alkin's London address was the former palace of Whitehall. Her pension, the permanent maintenance once voted to her by a grateful Parliament, was, however, never paid. Only on January 4, 1653, do we find her in receipt of £10 " for good services to the public," by warrant from the Council of State.[22]

These facts may not appear to have much bearing on Elizabeth Alkin's work as a nurse during the first Dutch War, but they throw some light on her character and suggest something of the confused motives which led her to offer her services to the wounded in 1653. Mrs. Alkin's intense political convictions were matched by her keen intellect, her restless love of adventure, her energy, and the power of her emotions. After the high tension under which she had lived until after the battle of Worcester, a retired life in London could have had little appeal for her. Apart from her single-minded devotion to the Commonwealth, or at least her animosity towards the late king's party, she allowed her heart to govern her head. When her compassion was aroused, all other considerations were set aside. A Puritan, she successfully petitioned in 1653 for the release of a Roman Catholic priest, Thomas Budd, from Newgate for three months, so that he might recover his health and leave the country, in accordance with the act " requiring all priests and Jesuits to depart this nation." [23] That she achieved this at a time when national passions were running high and the authorities were distracted by the multiple demands of the war at sea, is an indication that her influence in many quarters remained great. She could certainly command the admiration and solicitude of the men with whom she was soon to work, and in that work among the wounded

[21] *Calendar of the Proceedings of the Committee for Advance of Money*, 1642-56, p. 518.
[22] *Calendar of State Papers Domestic* (1652-53), 484.
[23] *State Papers Domestic*, xxxiii/21, February 4, 1653.

she was as unable to discriminate between friend and foe, as she had been between a priest and a Puritan.

Late in February, 1653, news reached London of the heavy casualties sustained in the battle of Portland between the 18th and 20th, and of the suffering of the wounded men landed at Portsmouth, Deal, and Dover, where no provision had been made for them. On February 22, Mrs. Alkin appealed to the Council of State to utilise her experience, and "appoint her to be one of the nurses for the maimed seamen at Dover."[24] The Council immediately directed[25] the Commissioners for the Admiralty and Navy "to do therein what is desired," for they well knew the truth of the statement in her petition that she had "evermore been faithful and serviceable to the State upon all occasions in these late wars." Two days later Mrs. Alkin received her warrant[26] "to attend the sick and wounded," not at Dover but where there was even greater need, at Portsmouth and the adjoining villages. In passing it may be noted how on this, as on all other occasions during the Dutch war, the authorities acted with a sense of extreme urgency and liberality, whenever the treatment of the wounded was involved.

Mrs. Alkin was provided with "a reasonable allowance" by the Navy Commissioners, "for that service she shall perform therein" and, if she was fortunate, travelled to Portsmouth in the waggon which once a week linked the metropolis with the port. Surgeons were sent from London,[27] and seven shillings a week were granted[28] for lodging each sick or wounded man. At Portsmouth there was great confusion; the patients lay in the streets until accommodation could be found for them. When they were taken to private houses, or to the ale-houses with which the port abounded, the surgeons had difficulty in finding them. The conditions with which Mrs. Alkin was confronted on her arrival at Portsmouth, evoke an inevitable comparison with those which, two centuries later were faced by Miss Erskine at the Royal Naval Hospital at Therapia, during the Crimean War. Unpaved, undrained, and enduring an epidemic of smallpox, its governor, Colonel Nathaniel Whetham, could only comment on "the filthy nastiness of the place."[29]

[24] *State Papers Domestic*, xxxiii/81, February 22, 1653.
[25] *State Papers Domestic*, xxxiii/82, February 22, 1653.
[26] *State Papers Domestic*, xxxiii/83, February 24, 1653.
[27] Oppenheim, M., *History of the Administration of the Royal Navy, 1509-1660*, London, 1896, 321.
[28] *Ibid.*
[29] *State Papers Domestic*, xxxiv/90, March 26, 1653.

By mid-March, the convalescent cases could be distinguished from the chronic, the amputations were over and, on March 15, thirty-two of these "tedious" cases set out on the eighty-mile journey to London [30] and the hospitals of St. Bartholomew, St. Thomas the Apostle, and the Savoy. The four waggons traversed the roads followed, in 1627, by the wounded from the Isle de Ré expedition, but now they were accompained by Mrs. Alkin; in the provision of surgeons and nurses for the party, no less than in the arrangements for the nightly halts during the three or four day journey, she probably played a directing part. This was recognized in the grant [31] of £13.6.8 made to her for her services at Portsmouth and on the London road. The value of her contribution to the welfare of the wounded is evident from the request, made to her by the Admiralty Commissioners, that she should go to Harwich, prior to the battle which was daily expected off the coast in June and took place on the 2nd and 3rd of the month. Major Nehemiah Bourne, the Navy Commissioner, was also appointed to Harwich, and with him she was soon working in the closest harmony.

Only passing reference can be made here to Dr. Daniel Whistler who now, as at Portsmouth and elsewhere, made all the arrangements with the Company of Barber Surgeons of London for the appointment of surgeons and the provision of medical supplies at the many places where they were required. His immense services to the nation at this time have been wholly overlooked by his biographers, who have divided their attention between his youthful work on rickets, while at Leiden university, and his dismissal from the presidency of the College of Physicians.

Of the details of Mrs. Alkin's work at Harwich there is no record, although in a letter to [32] Robert Blackborne, secretary to the Admiralty Commissioners, she refers to her expenditure on the wounded "to have them cleansed in their bodies and their hair cut, mending their clothes, reparations and several things else." Two hundred years later Miss Nightingale wrote to Sidney Herbert in almost identical terms concerning two hundred men landed from the *Severn* transport.

On July 10, 1653, General Monck wrote [33] from the *Resolution* at Southwold to the Admiralty Commissioners, "Our men fall sick daily, besides a considerable number already sent ashore," the condition being an acute enteritis caused by decaying victuals. All along the east coast, the sick and wounded were being landed. He asked for provisions to be

[30] *State Papers Domestic*, xxxiv/36, March 16, 1653.
[31] *Calendar of State Papers Domestic* (1652-53), 490.
[32] *State Papers Domestic*, xxxviii/5, July 2, 1653.
[33] *State Papers Domestic*, xxxviii/34, July 10, 1653.

made for them at Hull, and mentioned complaints from Ipswich, Aldeburgh, Southwold, and Dunwich that no money had been sent to meet the cost of their lodging: "the inhabitants begin to weary of them," he wrote. Mrs. Alkin herself found nurses and paid them. Organizing the work of these women over a wide area, feeding, sheltering, and encouraging the wounded, incurring ever-mounting bills with the local apothecaries for physic for the sick, she exhausted her body as well as her purse: "I have laid out my monies," she wrote [34] from Harwich, "for divers necessaries about the sick and wounded men here; it pities me to see poor people in distress. I cannot see them want if I have it."

It is not surprising that she was constantly in need of money, for she had only been provided with £5 and, within a day or two of her arrival, there were two hundred wounded seamen at Harwich alone, a number for which the Admiralty Commissioners were requested [35] to supply eight or ten surgeons. By July 2, Mrs. Alkin, using her own money, had spent three times the sum orginally given to her and was owing for her "diet." From Harwich she went "often to Ipswich to visit the sick and wounded there, and return again to Harwich, so that," as she explained, "in coming and going money departs from me. I was necessitated to get xxs from the Mayor of Harwich, and he is at great want of monies himself." [36] Under the strain of housing, serving, and feeding so many seamen, the condition of the mayor only reflected the general state of the little port which, according to Major Bourne, had by September become "very nasty and sickly, and," he added, "the truth is something like a prison to me." [37]

Mrs. Alkin too felt the general oppression but remained at Harwich: "Major Bourne," she wrote,[38] "is desirous to have me stay until it be heard the event of this new engagement, or else I could have been willing to have come to London with the wounded men," whom Dr. Whistler was sending to the metropolitan hospitals, as soon as he could safely evacuate them. These were the "tedious" amputation cases and, in the following December, they were still requiring the "extraordinary care and pains" [39] of the physician and the surgeons of St. Thomas's hospital to an extent that prompted a request for a special "gratuity." These patients were not easy to manage, if we may judge from the action which had later to be

[34] *State Papers Domestic*, xxxviii/5, July 2, 1653.
[35] *State Papers Domestic*, xxxvii/32, June 4, 1653, and xxxvii/112, June 18, 1653.
[36] *State Papers Domestic*, xxxviii/5, July 2, 1653.
[37] *State Papers Domestic*, xl/126, September 27, 1653.
[38] *State Papers Domestic*, xxxviii/5, July 2, 1653.
[39] *Minutes of the Court of Governors, MS.* in the hospital archives.

taken at St. Bartholomew's: there they gave so much trouble that, on May 22, 1654, all the "sea-souldiers" were summoned before the governors to hear a letter read from the Board of Sick and Hurt. These naval officials warned them "that if they did hereafter disorder themselves by drinke or did lye out of their wards or did not observe the rules in this house, that they should bee presently dismissed this hospitall and put out of the states pay," [40] a warning which proved ineffective, for five days later sea-soldier Buggs and another had to be discharged because they "weare commonly drunke and distempered and by reason thereof much troublesome by beating and misusing the said patients and others in the said ward . . . their disorderly lives doth very much hinder and procrastinate their cures being alsoe a badd example to others." [41]

From Mrs. Alkin no such complaints are heard and it may have been due to her influence that Major Bourne was able to report to the Admiralty Commissioners, "the seamen generally gave a good character of the country people with whom they have been quartered for their care and tenderness over them." [42] Later, the counties of East Anglia received a vote of thanks for these services from a grateful Parliament.

Mrs. Alkin remained at Harwich until, on July 31, 1653, the last great battle of the war had been fought and won. The Dutch flag-ship, *Brederode*, still wore Martin Tromp's flag as she led the shattered fleet with its dead and wounded back to the United Provinces, but the admiral lay in her great cabin, a musket bullet through his heart. This was the weapon which throughout the war had caused the greatest number of casualties, and it was as much for the benefit of musketeers as for the gunners that the regulation was framed to withhold a broadside until within "distance of caliver or pistol shot." [43] But in addition to musket wounds and splinter wounds, there were many cases of sickness in the English fleet at the time of this victory, and all were brought to Harwich. Dr. Whistler and Mrs. Alkin, together with Major Bourne, had to provide for five hundred patients in an area without a hospital, and it is not surprising that this war, more than any other, firmly established the case for special naval hospitals.

Some three hundred and seventy patients were sent to Ipswich, and another hundred and seventy accommodated at Harwich. The difficulties were increased by the presence of a thousand wounded from earlier battles, distributed between the two towns, so that by August, 1653, Dr. Whistler

[40] *Archives of St. Bartholomew's Hospital*, Ha 1/5, f. 99*r*.
[41] *Loc. cit.*, Ha 1/5, f. 129*r*.
[42] *State Papers Domestic*, xxxviii/111, July 31, 1653.
[43] Corbett, J. S. (ed.), *Fighting Instructions 1530-1816*, London, 1905, 68.

reported [44] nearly sixteen hundred cases scattered over the countryside at Harwich, Ipswich, Aldeburgh, and all the adjacent villages. The problem of their provision was only one of many similar ones confronting the Navy Commissioners, for there were still a great number of naval patients lying at Yarmouth and Dover, and many remained at Weymouth from the battle of Portland. It was this situation which led to proposals [45] being made that summer and implemented on September 29, 1653, when "Commissioners for considering and giving relief unto sick and wounded men" were appointed; [46] it is to this board that the present naval medical administration can be directly traced.

The demand on the limited accomodation in East Anglia was so great that little except the meanest was available for the thousand Dutch prisoners who must now be given a roof and guarded. Probably they were lucky if they got a dry barn, for, in London, among other places they had to lie in the cavalry stables known as The Mews, a site now covered by the National Gallery. On September 13, 1653, the representative of the United Provinces, writing from London, reported [47] to the States General that the prisoners were suffering greatly, many were sick, and the mortality was high for they were "lying upon straw, without anything to cover them and in the open air." He was trying to arrange an exchange, and there was already a well-organized escape route.

Among the Dutch prisoners in Suffolk were wounded men, but whether Dr. Whistler could question them in their own language, remembered from his student days, is not stated. Mrs. Alkin gave them what help she could afford and such time as she could spare. Major Bourne sent her £10, but she paid out £6 at Harwich and, since she could not resist the call of suffering, "at Ipswich, disbursed money for the relief of the poor Dutch prisoners" and, she wrote, "seeing their want and misery to be very great, could not but have some pity towards them (though our enemies)." [48] The rate at which money flowed through her hands, and her consequent destitution, caused friendly concern among officials in London, and Robert Blackborne wrote to Major Bourne asking him to take care of "Parliament Joan," a request which the harassed Navy Commissioner promised to fulfill.[49]

[44] *State Papers Domestic*, xxxix/75, August 25, 1653.
[45] British Museum, *Additional MSS.*, 9300, f. 255.
[46] *State Papers Domestic*, xl/141, September 29, 1653.
[47] Gardiner, S. R., and Atkinson, C. T. (ed.), *Letters and Papers Relating to the First Dutch War*, 6 vols., London, 1899-1930; 6, 70-1.
[48] *State Papers Domestic*, lxvi/54, February 22, 1654.
[49] *Calendar of State Papers Domestic* (1653-54), 480.

Although the war was over, Mrs. Alkin lingered at Harwich. Perhaps she stayed to nurse its victims, or she may have been unable to see any clear future for herself now that she was needed neither for intelligence work nor among the sick and wounded men. Her courage may have failed with her health, for by the autumn she was exhausted in body and in mind. The winter winds swept across the east coast, her cross-country rides ceased, and for her, too, Harwich became a prison. A sick woman she returned to Whitehall. Unsparing of herself and of her money, she was now "in a course of physick" and had to employ two nurses to attend her, and on arrival at her lodgings there were but three shillings in her purse.[50]

Possibly it was these straits which led her once more to become an informer, for on December 6, 1653, we find a Committee of the Council of State considering evidence supplied by Mrs. Alkin regarding "the murder committed by the Portuguese upon the new Exchange"[51] and on December 8, she received £10 "for her services."[52] In January, 1654, the Council of State itself issued a warrant to pay her £10, a payment long overdue and made in accordance with the former order of Parliament regarding her permanent maintenance. The Council also arranged[53] for the payment of arrears of what was owing to her for her services to the sick and wounded. In fact, neither sum appears to have been forthcoming. The expenditure on the war had been immense, and now a new war against Spain was being planned, yet the sources of ready money had been drained and the government was beginning to experience those difficulties which had once harassed the penurious royal exchequer.

To meet her mounting bills for physic and the cost of her two nurses, Mrs. Alkin was compelled to sell the contents of her lodging at Whitehall. When even her bed had gone, she appealed for her pension to be "mended" (increased), or that she might be given a special grant, or admitted to an almshouse where she might end her days. Twice she wrote[54, 55] to the friendly Blackborne, asking him to intercede with the Commissioners of the Navy and stressed that she had lost her health in the service of the state through her "continual watchings night and day," and her earlier "endeavours to serve this Commonwealth." There was no trace left of the vigorous Parliament Joan when she wrote "I am a very

[50] *State Papers Domestic*, xlvi/54, February 22, 1654.
[51] *State Papers Domestic*, xlii/17, December 6, 1653.
[52] *Calendar of State Papers Domestic* (1653-54), 457.
[53] *State Papers Domestic*, xlv/19, January 10, 1654.
[54] *State Papers Domestic*, lxvi/54, February 22, 1654.
[55] *State Papers Domestic*, lxvi/75, February 27, 1654.

weak woman, having many infirmities upon me"; and when she asked for relief, "my days being but short," she had already faced the end. Perhaps recalling her long struggles with an unresponsive bureaucrasy, she added that she hoped she would soon "be no more troublesome to you."

In April she had, however, once more to petition [56] for her pension. To add to her anxieties, she was now, with some thirty other men and women, directed to surrender her rooms at Whitehall.[57] In the preceding December, Cromwell had become His Highness the Lord Protector, and the man who issued orders above the signature "Oliver P." required that all accommodation in Whitehall should be at his own disposal. In May and September she received some financial relief, one payment for £10 being "for physic and nursing sick and wounded seamen and prisoners," which she now needed so much for herself, the second £10 being for her long overdue "relief and maintenance." [58] There are no further warrants for the support of Mrs. Alkin, and she was increasingly overlooked by a government at a loss to find money for all the demands it had created.

She appealed once more in 1655, and that May yet another committee, the one for petitions, referred her case to the Committee for removing Obstructions.[59] On a certificate from this body, an Order in Council was issued and the whole lengthy procedure resulted in Mrs. Alkin receiving the modest sum of twenty marks. The last surviving record of Elizabeth Alkin is an undated one: she asked [60] for permission to be buried without charge in the cloister garth of Westminister Abbey. But this last memorial to her clear understanding, her forethought, and her sturdy courage finds no completion in the burial registers of the Abbey.

This article developed out of research connected with the second volume of *Medicine and the Navy 1200-1900*, the first volume of which is in the press. The work is being carried out with the aid of a grant from the Wellcome Trustees, to whom my thanks are due. I am grateful to Mr. Gregory Robinson, of the Society for Nautical Research, for drawing my attention to the similarity of one of Mrs. Alkin's letters and one of Miss Nightingale's, and to Miss Veronica Stokes, Assistant Archivist of St. Bartholomew's Hospital, and Miss E. M. McInnes, Archivist of St. Thomas's Hospital, for their kind assistance.

[56] *State Papers Domestic*, A. xciii/80.
[57] *State Papers Domestic*, lxix/9, April 3, 1654.
[58] *Calendar of State Papers Domestic* (1654), 447, 456.
[59] *State Papers Domestic*, xcvii/29, May 11, 1655.
[60] *Historic MSS. Commission*, *4*, 180/56.

MERREM'S YOUTHFUL DREAM

The Early History of Experimental Pylorectomy *

OWSEI TEMKIN

In 1810, Daniel Karl Theodor Merrem, born in Duisburg, Germany, on April 19, 1790,[1] published a booklet of 46 pages entitled *Animadversiones quaedam chirurgicae experimentis in animalibus factis illustratae*[2] which, among other things, contains an account on experimental pylorectomy. The significance of that account was recognized by Gussenbauer, an assistant of Billroth, who himself had started a series of similar experiments. Gussenbauer and von Winiwarter's publication of 1876 included an analysis of Merrem's work.[3] This study of his assistants, seconded by similar work at Czerny's clinic in 1881, led Billroth to perform a successful pylorectomy on a patient, after attempts in a similar direction had been made by Péan.

While Merrem's role in the history of pylorectomy is receiving full recognition in the surgical literature,[4, 5] some details regarding his contribution and its antecedents do not seem equally well known. I shall, therefore, present an account of his experiments on excision of the pylorus

* Based on a lecture before the Johns Hopkins Medical History Club, March 16, 1953. I am indebted to my wife for assistance in the English phrasing of my Latin translations.

[1] For a short biographical sketch see the obituary in *Allgemeine medicinische Central-Zeitung*, Nov. 2, 1859, *28*: 695-96, and Gurlt-Hirsch, *Biographisches Lexikon der hervorragenden Aerzte aller Zeiten und Völker*. Second ed., vol. 4, Wien und Leipzig, Schwarzenberg, 1932, p. 176.

[2] "Some surgical observations illustrated by experiments made on animals." The book appeared at Giessen with Tasché and Müller. A copy of the book is in the National Library of Medicine to which I am indebted for a microfilm copy.

[3] Carl Gussenbauer and Alexander von Winiwarter, "Die partielle Magenresection," *Archiv für klinische Chirurgie*, 1876, *19*: 347-380.

[4] See e. g. the following American publications: J. M. T. Finney and W. R. Rienhoff, Jr., "Gastrectomy," *Archives of Surgery*, 1929, *18*: 140-162.—J. M. T. Finney, Jr., "Pyloroplasty and gastroduodenostomy," *Surgery*, 1937, *2*: 738-758.—Julius L. Spivak, *The Surgical Technic of Abdominal Operations*. Fifth ed., Springfield, Ill., Charles C. Thomas, 1955, p. 538.—H. G. Moore, Jr. and H. N. Harkins, *The Billroth I Gastric Resection with Particular Reference to the Surgery of Peptic Ulcer*. Boston, Little, Brown and Co., 1954, p. 3 f.

[5] Of other recent works I mention here W. v. Brunn, *Kurze Geschichte der Chirurgie*. Berlin, J. Springer, 1928, p. 285. Garrison and Morton, *Medical Bibliography*. Second ed., New York, Argosy Bookstore, 1954, p. 300. Cesare Menini, "Spunti storici sulla resezione gastrica," *Minerva Chirurgica*, 1955, *10* (reprint).

based mainly on translations of the more important passages from the chapter dealing with the subject. Secondly, I shall inquire into the background of the experiments and shall finally try to evaluate their place within the *Animadversiones* as well as contemporary surgery.

1.

Merrem's experiments on pylorectomy are related in the third chapter of his book, headed "Extirpation of the pylorus."[6] He attempted to remove the pylorus in three dogs. The first operation is described as follows:

Experiment I.

On November 15, 1809, in the presence of my fellow students and friends Beyerle, de Beauclair, and Claus, Doctors of Medicine, I made an incision into the skin on the right side below the false ribs where the stomach passes into the duodenum. This was done on a black Pomeranian dog after the hair had been shaved. The dog was small, of uncertain age—perhaps two years old; on the preceding evening I had offered him a little bread and water, but today I had offered him nothing but water until 10 o'clock when I performed the extirpation. After the muscles had been cautiously dissected and the peritoneum opened, I inserted the index finger of my left hand and over it enlarged the upper and lower ends of the wound to the length of three inches. A prolapsed part of the duodenum and jejunum together with the smaller omentum was immediately placed back in their natural position. Then I separated the pylorus from the small omentum and a part of the duodenum from the mesentery. While this was being done, the pyloric artery[7] was torn—which hardly seems avoidable. I checked the rather large effusion of blood with a sea sponge soaked in spiritus vini rectificatus. Afterwards I extirpated the pylorus by twice applying the scissors so that I removed a part approximately three lines long from the stomach and duodenum. At the same moment both injured parts contracted with such force that with their edges turned backwards they formed two sphincters impeding all access. Therefore I drove in three needles, equidistant from one another, half an inch from the ventricular edge, and, at the same distance, I pushed them through the internal surface of the duodenum to its external surface. Nevertheless I was not able to complete the invagination by pulling the ends of the threads, nor could I effect anything except the accurate connection of the edges. The suturing of the abdomen was difficult; the omentum constantly prolapsed and became entangled with the threads. Finally, however, after the omentum had been carefully put back, the suture was completed with five threads. As to the threads of the enterorrhaphy, I affixed them to the external integument of the abdomen by means of adhesive plaster.

Upon the suture I put a triple compress moistened in spiritus vini, secured around the body by several turns of a simple bandage. For the sake of greater firmness

[6] *Animadversiones*, p. 21: "Exstirpatio pylori."

[7] *Arteria pylorica*, i. e. the right gastric artery.

and to prevent the access of air, I used, in addition, another bandage four inches wide which I fastened with pins on the back of the dog.

The animal was completely exhausted by the effusion of blood that equaled about two ounces. The weakness of the hind legs appeared very great so that the animal could hardly stand on them. A few drops of spiritus vini seemed to bring back the exhausted strength. The heart beats were slow and weak. The dog lay quietly until 5 o'clock at which time it drank one ounce of milk. However, when 8 o'clock had passed, it vomited with great difficulty, disgorging this milk together with some potatoes and bread which it had previously consumed.[8]

The detailed postoperative record shows that Merrem did all he could to keep the dog alive by means of nutritive enemas, and he succeeded in doing so until December 8, 1809, when the dog died, 23 days after the operation. During the interval, the animal had a leakage of bile through the wound, vomited frequently, and finally suffered from convulsions. The post mortem account reads:

In the internal abdominal scar and next to it to the extent of an inch many fleshy abnormal fibres had grown extending from the peritoneum to the pylorus. The pylorus itself, or to speak more truly, the end of the stomach, was nearly three eighths of an inch distant from the peritoneum, indeed its posterior part had coalesced very tightly with the transverse colon, and its lateral parts with the omentum and mesentery. From this and the induration the place of the extirpation was recognized. All vestiges of the gastro-duodenal suture had disappeared. The stomach was much contracted, having the width of only one inch, like the small intestine which, in conformity with nature, contained a mild, whitish juice. The colon and caecum were so swollen with much green fecal fluids that they were wider than the stomach. The rectum was so narrowed that I could hardly introduce a thin probe at the distance of one hand from the intestine. In the internal part of the liver lobe that covers the stomach I found a scirrhous whitish spot. The gall bladder together with the bile ducts was very much expanded, to the size of a Bergamotte pear, and contained much green bile. Pancreas and spleen were normal. The urinary bladder was of the size of an infant's head, darkish-black, surrounded by large vessels, and was so far from being blocked up that, on the contrary, a coffee-like urine to the weight of nearly one pound easily flowed out. The glans penis was denuded, the testicles swollen.[9]

The second experiment was the most successful and also the most disappointing. The operation itself is described briefly:

On the eighth of December, I extirpated the pylorus of a small, deaf, black *fricator*(?) dog of advanced age that had devoured a great quantity of lentil soup some minutes before. With only Dr. Claus assisting, an incision of two inches in length was made, whereupon a large part of the intestine prolapsed and was put

[8] *Ibid.* p. 23 f.
[9] *Ibid.* p. 29 f.

back with great difficulty. For the rest I proceeded in the same manner as in the first experiment, so that I cut off three-eighths of an inch from the stomach and one from the duodenum. Since the apertures of the stomach and duodenum were not much contracted, I introduced the former into the latter for about half an inch with the help of three threads. The abdominal suture was completed with two threads. I estimate the loss of blood at between an ounce and an ounce and a half. In this dog too I observed a weakness of the hind legs immediately after the operation.[10]

There follows the detailed history of an uneventful recovery until December 18, when the entry reads: "December 18. The scar becomes more and more contracted. The color of stool and urine is natural. Normal strength has been regained." [11] For more than five weeks afterwards the dog seems to have led a normal life, for there are no more entries until January 24, 1810, when Merrem writes: "The dog which until this time had enjoyed the best of health, was stolen." [12]

The third experiment, performed March 5, 1810, on a small, blind mongrel dog, did not differ much from the preceding one. Here too the stomach was invaginated into the duodenum.[13] However, the animal died on the following morning. The dissection of the cadaver revealed this picture:

The external integuments already cohered. In the region of the pylorus I found a small quantity of whitish pus. The stomach and duodenum had not yet coalesced. I noticed no signs of inflammation, not even in the actual site of the operation.[14]

Of the three animals, the last succumbed soon after the operation, the first apparently died from inanition, while the second regained perfect health and survived for a period long enough to allow Merrem to state: "Thus it seems confirmed by these experiments that the extirpation of the pylorus can be successfully performed; but experience has also taught that this operation is very difficult." [15]

2.

What stimulated Merrem to the experimental extirpation of the pylorus? Gussenbauer writes: "According to Merrem, a Philadelphia physician had already made an unsuccessful attempt to resect the pylorus

[10] *Ibid.* p. 30 f.
[11] *Ibid.* p. 32.
[12] *Ibid.*
[13] *Ibid.* p. 32 f.
[14] *Ibid.* p. 33.
[15] *Ibid.* p. 33 f. See also Finney and Rienhoff, *op. cit.* (ftn. 4) p. 141.

in a dog and a rabbit. This physician too was inspired to do so by observing a cancer of the pylorus in a medical friend." [16]

In a footnote, Gussenbauer remarks that Merrem did not give the source for his statement regarding the "Philadelphia physician." [17] Subsequent research has led to the opinion that John Jones was the physician concerned.[18] I believe that this is improbable [19] and that Gussenbauer's incomplete rendering is responsible for a search in the wrong direction. Merrem's account, for which I propose the following translation, is more explicit. It easily leads to the identification of the man and explains why it was unnecessary for Merrem to give any further reference.

A certain very distinguished teacher, a man highly to be respected, who rendered great service in restoring people to health in Philadelphia, where he once held the position of first physician to the Hessian auxiliaries, was very much shaken by the premature death of Doctor Middleton from an indurated and contracted inferior orifice of the ventricle. He pondered on the most efficacious remedy whereby this very dangerous disease might be conquered. The great and horrible tortures of his most beloved friend could not only not be removed, but could scarcely even be mitigated by all the remedies thus far recommended. Thus nothing was left but to remove the cause of the disease and to extirpate the pylorus itself. However, this operation seemed to be accompanied by such great and serious difficulties that the friend did not wish to perform it at that time. Two years ago he finally had experiments made on several dogs, some of them very sturdy ones, and on a rabbit. But all these experiments had unfavorable results, the blame for which I attribute to the difficulty of the operation itself, and to the inexperience of the surgeon.[20]

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[16] Gussenbauer and Winiwarter, *op. cit.* (ftn. 3) p. 368: "Nach Merrem hat bereits früher ein Arzt in Philadelphia [footnote: "Quellenangabe fehlt"] die Pylorusresection am Hund und Kaninchen erfolglos versucht. Auch diesem wurde der Gedanke daran durch die Beobachtung eines Pyloruscarcinoms an einem befreundeten Arzte besonders nahe gelegt."

[17] *Ibid.* See ftn. 16.

[18] See the literature quoted above in footnote 4.

[19] Being a Tory, Middleton at the outbreak of the Revolutionary War went to Bermuda and returned to New York after the British occupation of the city. (*Dictionary of American Biography*, ed. Dumas Malone. Vol. 12, New York, Scribner's, 1933, p. 603.) John Jones, on the other hand, went to Philadelphia when the British occupied New York (*ibid.* vol. 10, 1933, p. 181). Similar reasons also argue against John Morgan mentioned by Menini, *op. cit.* (ftn. 5).

[20] Merrem, *Animadversiones*, p. 21 f. "Praeceptor quidam perillustris, vir summe devenerandus et de reddenda hominibus sanitate meritissimus Philadelphiae, ubi medici primarii auxiliorum Hassiacorum vices quondam gerebat, morte praematura Doctoris Midleton (sic!), ex ventriculi orificio inferiori indurato coarctatoque orta commotus, de remedio eoque efficacissimo cogitabat, quo periculosissimus hicce morbus vinci posset. Amici dilectissimi tormenta magna et horribilia, omnibus hucusque commendatis remediis non solum non tolli, sed etiam vix mitigari poterant. Nihil ergo reliquum erat, quam morbi causam evertere, ideoque pylorum ipsum exstirpare; quae autem operatio cum

From this account the following conclusions can be drawn. The patient was Dr. Peter Middleton, a Tory at the time of the Revolutionary War, who is known to have died of cancer of the pylorus in New York on January 9, 1781.[21] Dr. Middleton's friend, the "distinguished teacher," was a physician with the Hessian auxiliaries. He thought of the possibility of curing Dr. Middleton by pylorectomy, an idea that he did not dare to translate into practice. However, he did not forget the matter and finally had some experiments performed about two years before Merrem wrote his book.

We are thus confronted with two unidentified men: the "teacher" who was a Hessian army doctor during the Revolutionary War, and the "surgeon" who performed some actual experiments about 1808. As to the physician with the Hessian troops, the quest leads to Christian Friedrich Michaelis (1754-1814) who in 1779 had become physician to the general staff of the Hessian troops in America.[22] While in New York, he apparently became very friendly with Drs. Bard and Bailley whom he frequently mentions in his letters to Germany, published in Richter's *Chirurgische Bibliothek*.[23] We find Michaelis in Charleston too, which had surrendered to the British in 1780.[24] I do not know whether he was ever able to visit Philadelphia and am, therefore, unable to explain the reference to Philadelphia in Merrem's account.[25] It may of course be a

tantis tamque gravibus difficultatibus conjuncta videbatur, ut tunc temporis eam perficere nollet amicus. Ante duos annos tandem experimenta in canibus compluribus, ex parte valde robustis, et in cuniculo fieri curavit, quae omnia tamen exitum habuerunt iniquum, cujus culpam et ipsius operationis difficultati et chirurgi imperitiae adtribuo." See also below, footnote 25.

[21] See article in *Dictionary of National Biography, op. cit.* (ftn. 19) p. 602, and Kelly and Burrage, *Dictionary of American Medical Biography*. New York, Appleton, 1928, p. 841 f.

[22] L. Pierce Clark, "Biographical sketch of Michaelis, the pioneer worker on nerve-regeneration," *Medical Record*, 1906, *69*: 425-426.—Franz Gundlach, *Die akademischen Lehrer der Philipps-Universität in Marburg von 1527 bis 1910*. Marburg, 1927, p. 193.

[23] Cf. D. August Gottlieb Richter's *Chirurgische Bibliothek*, Göttingen. Vol. 5, erstes Stück, 1779, pp. 111-132 (from London); *ibid.* drittes Stück, 1780, pp. 534-555 (from New York); *ibid.* viertes Stück, 1780, pp. 734-746 (from New York); vol. 6, erstes Stück, 1782, pp. 113-168: "Auszug aus verschiedenen Briefen des Herrn General-Staabsmedicus, Doctor Michaelis, zu Newyork" (mentions his experiences in the Charleston campaign); *ibid.* viertes Stück, 1783, pp. 722-741; vol. 7, drittes Stück, 1784, pp. 579-580 (see also vol. 8, erstes Stück, 1785, p. 122 ff.) "Ueber die Regeneration der Nerven," refers to him as "Leibmedicus," by this time he held the position at Cassel (see below). See also Clark, *op. cit.* (ftn. 22). On Michaelis' friendship with Dr. Bard see John Brett Langstaff, *Doctor Bard of Hyde Park*. New York, Dutton, 1942, p. 134 f. and *passim*.

[24] See preceding footnote.

[25] The reference remains puzzling regardless of whether we translate as we did above

mere mistake, Philadelphia having slipped in for New York thirty years after the event. On the other hand, Michaelis not only counted Benjamin Rush among his friends, but also, in his writings, referred to some personal contacts with "Dr. Redmann in Philadelphia."[26] Michaelis is best remembered through his work on croup and on nerve regeneration. In connection with the latter subject, Dr. Pierce Clark, in 1906, published an article on Michaelis which contains some interesting biographical detail,[27] but there is still space for further research.

After his return to Germany, Michaelis first went to Cassel; then, in 1786, to the University of Marburg where he held the chair of surgery until his death in 1814.[28] It was at this university that the young Merrem received his M. D. degree.[29] In other words, Merrem must have been a pupil of Michaelis. I suggest, therefore, that it is Michaelis whom Merrem calls "a certain very distinguished teacher."

Doubts about the identity of Dr. Michaelis with Dr. Middleton's friend are dispelled by other references in Merrem's *Animadversiones* (to which we shall return later) and the fact that the contemporaries were well aware of Michaelis' role. This evinces from one of the reviews of the book that appeared in 1811. A review in the *Allgemeine medicinische Annalen*

or understand the passage to read: "In Philadelphia, where he once held the position of first physician to the Hessian auxiliaries, a certain very distinguished teacher, a man highly to be respected who has rendered great service in restoring people to health, was very much shaken by the premature death of Dr. Middleton" etc. This reading would be the correct one were it not for the absence of a comma before "Philadelphia."

[26] *Medicinisch-praktische Bibliothek* von C. F. Michaelis, Leibarzt und Professor zu Cassel. Ersten Bandes, erstes Stück, zweites Stück, Göttingen, J. Ch. Dieterich, 1785-86, p. 238: "Mein Freund Dr. Rush . . .", p. 112: "Auch Dr. Redmann zu Philadelphia versicherte mich . . ." In Richter's *Chirurgische Bibliothek*, vol. 7, drittes Stück, 1784, p. 581 (see above, ftn. 23), Michaelis mentions "a certain Dr. Schiel" who had imported salt as a remedy for internal bleeding from Ireland to Philadelphia and continues: "Es ward bald unter den dortigen Aerzten bekannt; sie versuchten es, und fanden ihre Erwartungen übertroffen. D. Rusch (sic!), Schippen, Kühn u.s.w. lobten es ausserordentlich; und durch diese habe ich es zuerst kennen lernen." All this points to a visit by Michaelis to Philadelphia towards the end of his stay in America.

[27] See above, ftn. 22.

[28] In addition to the publications cited above, ftn. 22, see H. Hermelink und S. A. Kaehler, *Die Philipps-Universität zu Marburg 1527-1927*. Marburg, Elwert (Braun), 1927, p. 447 and *passim*. See also E. Ebstein, "Zur intravenösen Behandlung von inneren Blutungen mit Kochsalz-Chlorkalzium-Injektionen," *Münchener medizinische Wochenschrift*, 1917, *64*: 801-803; p. 801.

[29] Gurlt-Hirsch, *op. cit.* (ftn. 1) states that the *Animadversiones* served as his M. D. thesis. However, Merrem's own words (see below) contradict this. From A. C. P. Callisen, *Medicinisches Schriftsteller-Lexicon*, vol. 12, Copenhagen, 1832, p. 478, I gather that the title of Merrem's thesis was *Observationes in Authenritii methodum tussi convulsivae medendi* (Marburg 1810).

limited itself to a short summary.[80] A review in the *Bibliothek für die Chirurgie* edited by Langenbeck included some scathing remarks on pylorectomy. "It is inconceivable to me how one could even hit upon the idea of extirpating the pylorus in man, and it should not even be necessary to give reasons why the operation can never succeed in man . . ." And again: "I consider this operation a means of expediting from this world, more quickly but in an excruciating manner, a man who is past saving."[81]

The last of the three reviews which I have been able to trace appeared in the *Medizinisch-chirurgische Zeitung*; it was much more friendly, and contained the following interesting summary of the pre-history of Merrem's experiments. "In America, Professor Michaelis had the misfortune of seeing Dr. Midleton [sic] die of an induration of the lower orifice of the stomach. Some years ago, he therefore performed experiments regarding extirpation—all of which ended fatally. The author [i.e. Merrem] here relates his experiments in dogs" etc.[82] This reviewer credits Michaelis not only with the idea of curing the disease by pylorectomy, but makes him perform the early experiments. It is doubtful whether Merrem would have given such a detailed and unsparing account of the bungling manner in which the previous experiments had been performed[83] if the actual experimenter had been his revered teacher. However that may be, I am unable to throw any further light upon the experimenter of c. 1808.[83a]

Michaelis' connection was still remembered in 1841 in the paragraph

[80] *Allgemeine medicinische Annalen*, Supplement Bd. 1801-10, Heft 2, 1811, col. 180. Regarding the experiments on pylorectomy, the entry states correctly that of the three dogs "one at least escaped with his life."

[81] *Bibliothek für die Chirurgie*, hrsg. von C. J. M. Langenbeck. Vierter Bd., erstes Stück, Göttingen, 1811, pp. 120-139; see pp. 135 and 138. Omodei in the *Annali di Medicina Straniera*, 1814 (quoted by Menini, *op. cit.* above ftn. 5) also expressed doubts about the practical applicability of the experiments.

[82] *Medicinisch-chirurgische Zeitung*. Zweyter Band, Salzburg, 1811, pp. 177-180; p. 178. The three reviews I discuss here are mentioned in Callisen, *loc. cit.* (ftn. 29).

[83] The detailed description continues directly upon the passage quoted above, footnote 20. "Sectione cruciformi, cujus pars perpendicularis a cartilagine xyphoidea ossis sterni ad regionem umbilicalem usque tendebat, usus est. Intestina prolapsa post horam dimidiam demum reposita, duodenum in ventriculum invaginatum, hepar saepe laesum etc. etc.; imo in cuniculo extremam partem alterius cujusdam intestini non nominati in alterum pollicis latitudine invaginavit, ita ut ductum felleum et pancreaticum rumpi, vel tamen obturari necesse esset. Quibus de animalibus tam male affectis nullum per horas XXIV vixit, cuniculus autem jam duodecim horis post obiit."

[83a] Menini, *op. cit.* (ftn. 5), referring to F. Freschi, *Storia della medicina in aggiunta a quella di Curzio Sprengel*, Milano, 1851, writes: "Primo di lui [i.e. Merrem], però F. G. Michaelis (1754-1814), l'anatomico di Marburgo, aveva proposto tale intervento, eseguendolo anche sui cadaveri . . ."

on "Extirpation of the pylorus" in the second edition of Blasius' textbook of surgery, where we read:

In scirrhus of the pylorus, when cure by drugs is impossible, Merrem has proposed to extirpate it after laparotomy and then to fasten together stomach and duodenum. The animal experiments made by him and Michaelis were insufficient and could not be decisive anyhow. Langenbeck is right in his judgment that the operation would only cause a faster and more excruciating death to the patient who is past saving.[34]

Since it was this entry that drew Gussenbauer's attention to Merrem and his work,[35] Gussenbauer's reference to "a physician in Philadelphia" is all the more remarkable and must be attributed to Merrem's indirect way of referring to Michaelis as "a certain very distinguished teacher." The last reference to Merrem's experiments on pylorectomy—before Gussenbauer's rediscovery—apparently is the short entry in 1861 in Günther's voluminous work on surgical operations. The paragraph reads:

Exstirpatio pylori

The proposal made by Daniel Carl Theodor Merrem (c. 1811) to extirpate the carcinomatous pylorus in man, we mention only as a curiosity. He bases his proposal on his experiments on three dogs in which he had extirpated the pylorus and which, however, all had succumbed.[36]

The inaccuracy of this report indicates that it was written without direct acquaintance with the *Animadversiones*. Pylorectomy had become an all but forgotten idea.

3.

Michaelis must have discussed the pros and cons of pylorectomy in man at some length. As Merrem tells us, his "most illustrious teacher in his academic lectures" was cautious in recommending the operation and raised a number of doubts. "I shall set forth here," Merrem writes, "the doubts and counterarguments of this man, to whom I owe the highest respect and reverence, and shall add my own comments, be they as they may."[37] The first doubt referred to the uncertainty of the diagnosis. Michaelis believed that the operation might be indicated if:

[34] Ernst Blasius, *Handbuch der Akiurgie*. Dritten Bandes erster Theil, 2. Aufl., Halle, Anton, 1841, p. 133.

[35] Gussenbauer and Winiwarter, *op. cit.* (ftn. 3) p. 367. The other reference they mention (p. 368) is Günther, on whom see below.

[36] G. B. Günther und B. Schmidt, *Lehre von den Operationen am Bauche des menschlichen Körpers*, Leipzig-Heidelberg, Winter, 1861, p. 31 (*Lehre von den blutigen Operationen*, IV, 2).

[37] Merrem, *Animadversiones*, p. 34.

(a) the patient appeared a certain prey of death, all other remedies having proved of no value after prolonged trial;

(b) upon palpation "an indubitable induration in the right region of the stomach" was found;

(c) the patient suffered "from obstruction of the bowel and chronic vomiting shortly after meals." [38]

Throughout the discussion, Merrem appears more sceptical than his teacher. In particular he points out that "when an induration is perceived in the right region of the stomach, it is by no means necessary that it always originate from the pylorus since it could hail from an induration of the abdominal integuments or of the pancreas in the place where it is attached to the duodenum, or from some other tumor." To this he adds the following story:

> That such an induration of the pancreas can present all the symptoms of a compressed and indurated pylorus, nobody will deny. A singular and memorable example of such a doubtful diagnosis was once presented by a man in the medical clinic who vainly took much and manifold medication over a long period of time and who is still alive today. The very distinguished teacher believed this disease to be an induration of the pylorus. On the other hand, Sternberg, the prematurely deceased erstwhile professor of medicine,[39] tried with many arguments to prove that the patient suffered from an indurated pancreas. Thus, the two men, steeped in knowledge and experience, went quite different ways, nor is it possible to doubt the disastrous outcome of the operation if the patient had consented to the extirpation of the pylorus and Sternberg's opinion had been confirmed by the experience, granted that examples are not lacking of the successful removal of the pancreas in dogs.[40]

Briefly summarized, the other "doubts" involve the very dangerous nature of wounds of the stomach, the digestive difficulties necessarily resulting from the operation, the occasional healing of the disease through suppuration by the healing power of nature, the uselessness of the operation "if the induration originated from a true scirrhus of the pylorus," [41] the possibility that the ductus choledochus and the ductus pancreaticus might close, and, finally, that bile would enter the stomach without impediment. To the discussion of these doubts, Merrem adds the following remark:

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[38] *Ibid.* See also Finney and Rienhoff, *op. cit.* (ftn. 4) p. 141.

[39] According to Gundlach, *op. cit.* (ftn. 22) p. 212 f., Johann Heinrich Sternberg (1772-1809) was Professor of Pathology and Therapy at Marburg from 1804 to 1809.

[40] *Animadversiones*, p. 35 f.

[41] *Ibid.* p. 39: "Dubium V. *Indurationc pylori ex scirrho vero orta exstirpatio nil proficit.* Hic casus ex sententia perillustris praeceptoris perquam raro occurrit. Mihi hac de re judicium non competit."

To these doubts, proffered by the inventor of this operation himself, one might add the very great debility of the patient weakened by the indurated pylorus and by hunger, the fact that this disease mostly affects persons of advanced age, in their sixties and seventies, whose nature is rarely strong enough to support the art, and the great difference between those persons and healthy and lively dogs.[42]

The discussion of the doubts throws some light upon the state of contemporary surgery. In the first place, we obtain a picture of the difficulty of diagnosis and of the uncertain status of pathology. "True scirrhus" meant cancer; its distinction from induration was not clear.[43] But it is remarkable that Michaelis apparently believed cancer of the pylorus a rare disease, admitting at the same time that pylorectomy might be of no avail for its cure. Here Merrem merely stated his teacher's opinion, declaring himself incompetent to judge.[44] Gussenbauer and v. Winiwarter, reviewing Vienna post-mortem protocols from 1817 to October 1873, among a total of 61,287 dissections found 903 cases of cancer of the stomach, a large number of which were localized in the pylorus.[45] The article of these authors has been credited with drawing attention to the frequency of cancer of the pylorus as well as the chances of cure by pylorectomy.[46]

Of interest too is the attitude towards animal experimentation. Merrem distinguishes between the physiological results and the medical inferences. Although he knows of successful removal of the pancreas in dogs (probably a reference to J. C. Brunner's experiments[47]), he does not even mention the possibility of removing a diseased pancreas in man. His own experiments prove to him that theoretically pylorectomy is a possibility, practically a more than doubtful hazard.

But Merrem's qualified scepticism regarding pylorectomy in man must not overshadow the fact that this chapter of the book, like all the others,

[42] *Ibid.* p. 40.

[43] The word *scirrhus* denoted either merely a hardened swelling or the initial stage of cancer (see Meissner und Schmidt [editors] *Encyclopädie der medicinischen Wissenschaften*, vol. 11, Leipzig, 1833, p. 110); it is probably in the latter sense that Michaelis speaks of "true scirrhus." The contemporary vagueness is well illustrated by the remark of F. G. Voigtel, *Handbuch der pathologischen Anatomie*, 2. Bd., Halle, Hemmerde und Schwetschke, 1804, p. 519: "Die wichtigste Krankheit des Pförtners ist dessen Ausartung in eine knorpelartige und scirrhöse Verhärtung, wodurch er verengert und zum Durchgange der Speisen ungeschickt gemacht, oft gänzlich verschlossen wird."

[44] See above, footnote 41.

[45] *Op. cit.* (ftn. 3) p. 373 ff.

[46] Ludwik Rydygier, "Ueber Magen-Resection, mit Demonstration von Praeparaten," *Archiv für klinische Chirurgie*, 1881, *26*: 731-743; see p. 732.

[47] R. H. Major, "Johann Conrad Brunner and his experiments on the pancreas," *Annals of Medical History*, 1941, ser. 3, *3*: 91-100.

has a surgical outlook. The first chapter of the *Animadversiones* received sufficient attention to be translated into French.[48] It deals with "A speedier method for the treatment of wounds of the skull made by the trepan."[49] In a dog and a cat Merrem showed that the bone removed in trephining could be used to cover the defect. He proposed the use of the same procedure in man, or, if the removed piece were too badly injured, substitution by "a piece of bone of the same size from a sheep, dog, cat, or other animal."[50] Von Walther in 1821 is said to have employed the method successfully in a patient,[51] and Merrem is thus assigned an important place in the history of cranioplasty.[52]

Incidentally, this chapter also shows that Merrem did not perform animal experiments lightly. He tried out a perforating instrument of his invention on animal and human cadavers, but not in living animals, because the matter was self evident and "because torments inflicted on animals go against humane feeling if they serve to illustrate a matter that needs no explanation rather than the explanation of important things."[52a]

The title of the second chapter maintained the thesis that "Tracheotomy may yet be undertaken for the removal of bodies which have been carried through the trachea as far as the lungs."[53] The case of a girl in whom a kidney bean had entered the lung gave rise to the question whether a foreign body could be removed through an opening by tracheotomy. In two cats, Merrem introduced a wax ball the size of a pea through a tracheotomy wound. The ball could be recovered through the aperture, and the wound healed.

Next in order comes the chapter on pylorectomy, while the fourth (concluding) chapter of the book deals with "The varying effect of the extracts of narcotics upon the eyes."[54] The experiments, in a dog and cat, were made in the hope of obtaining useful leads for the cure of blindness. The following drugs were instilled into the eye: extractum

[48] According to Callisen, *op. cit.* (ftn. 29) the translation was made by Laroche and appeared in *Journ. complém. du Dict. des Sc. méd.*, t. 7, 1820, cahier 25. Juil. pp. 54-62.

[49] *Animadversiones*, p. 7: "Vulneribus cranii modiolo factis celerior medendi methodus."

[50] *Ibid.* p. 17.

[51] See Burkard Eble in his continuation of Sprengel's *Versuch einer pragmatischen Geschichte der Arzneikunde*, VI, 1, Vienna, Gerold, 1837, p. 424, who, however, gives priority for the idea to Maunoir. I have not been able to verify this claim.

[52] A. Earl Walker, *A History of Neurological Surgery*. Baltimore, Williams and Wilkins, 1951, p. 242.

[52a] *Animadversiones*, p. 15.

[53] *Animadversiones*, p. 19: "Tracheotomia pro eliciendis corporibus per tracheam ad pulmones usque delatis, adhuc institui potest."

[54] *Ibid.* p. 41: "Extractorum narcoticorum vis varia in oculos."

hyoscyami, extractum stramonii, extractum aconiti, extractum belladonnae, extractum cicutae, extractum opii, aqua Laurocerasi. The strong mydriatic effect which he obtained with extractum stramonii induced Merrem to try it on a patient (the nature of whose eye trouble is not quite clear) with some encouraging initial results.

Garrison thus appears right in classing Merrem among the early representatives of "physiological surgery."[55] From the preface of the *Animadversiones* we learn that Merrem had planned to use his research as part of his doctoral thesis. There were, however, as he says, some obstacles which made this impossible at the time.[56] Thus he was already a full-fledged doctor of medicine when the *Animadversiones* appeared.[57] Yet he was still conscious of his status as a beginner; he ends the preface with the wish not to appear to the reader "wholly unsuited to be admitted to the practice of surgery."[58] As the opening lines of the first chapter show, he has a very high opinion of the status of surgery in his days. "Surgery, in our times, has made such great progress as hardly any other science. Diseases, which once were hardly cured in the course of many years, are now cured perfectly in the space of a few days. Diseases once incurable are now, in some cases, removed within minutes."[59]

We may ascribe this statement to youthful enthusiasm—but I believe that it echoes a sentiment of the times. Strange as it may seem to us who are inclined to think of surgical progress as beginning with the discovery of inhalation anesthesia and antisepsis, surgeons before 1846 did not lack self assurance. In 1826, only sixteen years after Merrem, A. Lembert described the results of his experimental intestinal resections with subsequent enterorrhaphy by the suture named after him.

> This operation (he wrote) is so simple in dogs that I have seen several of them begin to eat, digest, and defecate two days after the enterorrhaphy. Subsequent to the operation one noticed in these animals only a slight sadness and lack of appetite. But hardly had 48 hours passed when they regained their customary vivacity and vigor. Five dogs were operated upon, and all five survived.[60]

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[55] Fielding H. Garrison, *An Introduction to the History of Medicine*. Fourth ed., Philadelphia, Saunders, 1929, p. 728.

[56] *Animadversiones*, p. 3. See above, footnote 29.

[57] The title pages carries "Med. Doct." after his name. According to the obituary of 1859 (see ftn. 1) he was graduated on February 3, 1810.

[58] *Ibid.* p. 4.

[59] *Ibid.* p. 7.

[60] A. Lembert, "Mémoire sur l'entéroraphie, avec la description d'un procédé nouveau pour pratiquer cette opération chirurgicale," *Répertoire Général d'Anatomie et de Physiologie Pathologiques* etc. Paris 1826, *2*: 100-107; see p. 106. For this and the following see V. Zachary Cope, *Pioneers in Acute Abdominal Surgery*. London, Oxford University Press, 1939.

Anatomically and physiologically speaking, the fundamental technique of pylorectomy had thus been established some fifty years before its successful application in man. To be sure, it was not a planned project. As far as I can see, Lembert did not refer to Merrem or Michaelis.[61] Yet I believe it permissible to see a connection between the grasp of the idea of pylorectomy c. 1780 by Michaelis, its experimental pursuance by Merrem, and Lembert's experiments. The connection lies in the perspective which, as I have had occasion to point out elsewhere,[62] presents the history of modern surgery as a pace-maker of medical thought—especially with regard to "the anatomical idea." Seen in this perspective, some of the most daring surgical exploits of the time, e. g. Ephraim McDowell's ovariotomy of 1809, and the ligating of major arteries, do not appear quite the isolated deeds they are sometimes described. Such a view does not detract from the greatness of the individual surgeon. On the contrary, it adds to his stature by allowing us to distinguish between the professional self assurance of the time and the individual's insight and boldness to attempt the possible. With regard to pylorectomy, the situation was summed up somewhat quizzically by the surgeon Dieffenbach. Dieffenbach himself, as early as 1836, successfully used Lembert's suture in resection of the intestine in a case of incarcerated hernia.[63] Three years later, Amussat brought out his memoir on lumbar colostomy,[64] and in 1846 Sédillot proposed gastrostomy for artificial feeding. Writing in 1848, Dieffenbach said:

> If a patient with incurable obstruction of the oesophagus cannot get any food down and if tubes for feeding him will not pass through, an incision should be made through the abdominal wall, the stomach opened and the edges of the wound sewed to the external skin. Now if the same man were also suffering from an obstruction of the large bowel, so that the faeces could not pass out behind, and if according to Amussat the establishment of an artificial anus were indicated, then mouth and anus would be so close together that one might truly say human life is but a span!—In such operations, however, there is no salvation and they are no more practical than the ingenious Merrem's youthful dream of the diseased pylorus.[65]

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[61] Jacob Wolff, *Die Lehre von der Krebskrankheit*, vol. 4, Jena, G. Fischer, 1928, p. 158, claimed that "Antoine L. Lembert [in the above article] richtete die Aufmerksamkeit der Chirurgen wieder auf Merrem's Versuche."

[62] Owsei Temkin, "The role of surgery in the rise of modern medical thought," *Bull. Hist. Med.*, 1951, *25*: 248-259.

[63] Dieffenbach, "Glückliche Heilung nach Ausschneidung eines Theiles des Darms und Netzes," *Wochenschrift für die gesammte Heilkunde*, 1836, pp. 401-413.

[64] J.-Z. Amussat, *Mémoire sur la possibilité d'établir un anus artificiel dans la région lombaire sans pénétrer dans le péritoine.* Paris, Germer Baillière, 1839.

[65] Johann Friedrich Dieffenbach, *Die operative Chirurgie*, vol. 2, Leipzig, Brockhaus,

Considering the circumstances, Dieffenbach's criticism of pylorectomy as a dream was probably justified. But the dream, or rather the vision, belonged to Michaelis, while Merrem had the ability to perform some difficult experiments where another man had failed and the insight to distinguish between positive results, theoretical possibilities, and doubtful applications. This contention is documented by the paragraph with which he concludes the chapter on pylorectomy:

> From the doubts brought forward against the extirpation of the pylorus, from the arguments with which they may be answered, and from the additional observations, it appears quite clear that this operation which bears testimony to the very great ingenuity of its famous inventor, is undoubtedly the only means of removing this grave disease. And the operation is clearly not fraught with such great danger as to inspire the fear of death as a certain consequence, or such injury to the functions that the life to which a man is restored must forthwith be spent in sickness and misery. Indeed, the second experiment teaches both physiologists and physicians something most worthy of remembrance, viz. that an animal can live and feel well without a pylorus and its valve. The extirpation of the pylorus can, therefore, not be rejected entirely for anatomical and physiological reasons. At the same time, however, we are taught that the diagnosis is extremely doubtful. This fact, together with the condition of the patients and the effect to be expected from the extirpation of the pylorus, is such that a cautious physician can scarcely ever be audacious enough to have recourse to it.[66]

Far from being "youthful" (except in the biographical sense), Merrem's attitude was that of the practical man he proved himself to be by his subsequent career. Participating in the campaigns of the late Napoleonic wars he soon attained high administrative and teaching positions and died, in 1859, as a "Geheimrat" in Cologne.[67]

p. 445 f. Dieffenbach, *ibid.* p. 443 says: "Von der Estirpation des Pylorus sagt der geistreiche Sprengel: Ein Traum von Merrem." F. Helfreich, "Geschichte der Chirurgie" in Neuburger-Pagel's *Handbuch der Geschichte der Medizin*, vol. 3, Jena, G. Fischer, 1905, p. 209, states that Merrem in 1780 (sic!) had first raised the question as to the possible removal of the diseased pylorus, but that his experiments on animals had been unsuccessful. He adds: "Schreger (1825) hatte diesen Gedanken als einen Traum bezeichnet." In the absence of more exact references, I have been unable to trace either of these two alleged sources. In his "Critical review of the state of medicine during the last ten years," Sprengel wrote: "D. K. J. Merrem's proposal to extirpate the pylorus in incurable indurations of it, shows how little the surgeon dreads the most difficult operations" (quoted from the English translation, *Edinburgh Medical and Surgical Journal*, 1816, *12*: 385-411; 1817, *13*: 137-165. See p. 153).

[66] Merrem, *Animadversiones*, p. 40 f.

[67] See articles cited above, footnote 1.

THE WILLIAM OSLER MEDAL ESSAY

THE DISCOVERY OF THE PULMONARY CIRCULATION: A NEW APPROACH *

EDWARD D. COPPOLA

> At that time lived Galen of Pergamum who has been until now the most learned and most eloquent man in his art. Galen, desirous of teaching everyone, and believing there was very little difference between the fashion of man and that of the ape, wrote an anatomy of our body using as an example (as can be seen from his writings) the ape. And because there were in that age few men who had written about this, and they of little reputation, and because he was most excellent in the other fields of medicine, everyone readily believed him, no one being able to prove the contrary since dissection of men was forbidden. Galen's reputation endured until our times with no one ever having dared to contradict him in anything until Andreas Vesalius began to open the eyes of many, showing that one ought not to lend faith to all that which is found in books, as do many who wish to appear wiser than they really are. Such people, deeming it too laborious to examine everything thoroughly, and realizing that, if they did this, they would not be so sure of many things, and would be held in less esteem by the common people, give such authority to some writers that they do not in any way wish to concede that these writers might have been able to err. They do not consider that those to whom they lend so much faith were men, as we are, and easily could have neglected or been mistaken in something, as we see happen every day to the most learned of men. Furthermore, since all the books in ancient times were written by hand, besides the fact that many errors were made in copying them, it often happened that someone reading a book noted something in the margin, and from then on those who were copying, not knowing that they were annotations, presented these marginal notes as words of the author. In this and in many other ways, as each one can consider for himself, I believe that the books of the ancients are incorrect in such a way that no man of good sense can, nor should, give much credence to them without first investigating the facts which lazy teachers pass on to him. These lazy ones, even if they do not wish to take such trouble, should at least not seek to defend their ignorance with the authority of this or that author, especially in those things in which one can touch the contrary with one's own hand. If we well consider anatomy, of which we now speak, we shall readily find many things therein which demonstrate clearly that those who wish to defend Galen, saying he wrote the anatomy of man, do that author a great injury, make him a liar at every turn, and further show that they have never seen any man dissected.
>
> (Valverde, *Anatomia del corpo humano.* Italian translation, Rome, 1559, *l.* 2a.)

* Based on an M. D. thesis submitted to the Yale University Department of the History of Medicine, May 1955. Some revisions for publication were made in the present essay.

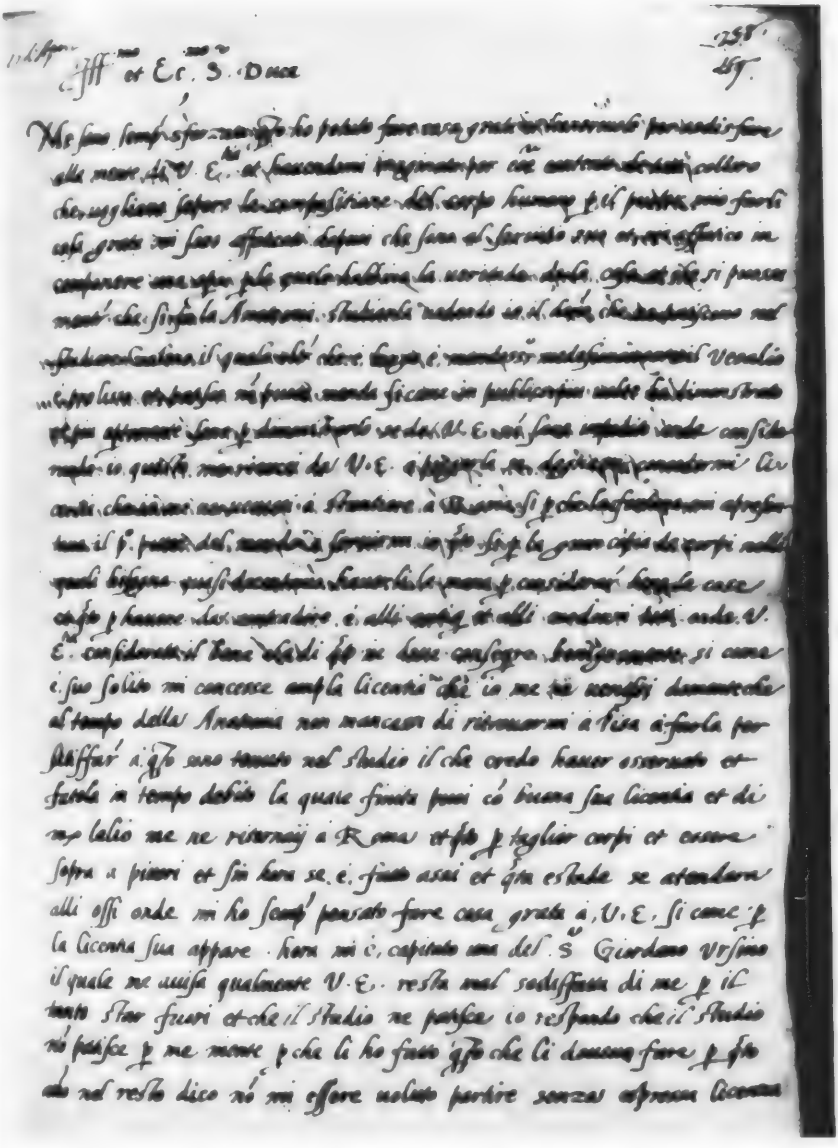

Fig. 1
Letter from Realdo Colombo to Cosimo I, 17 April 1543 (recto).

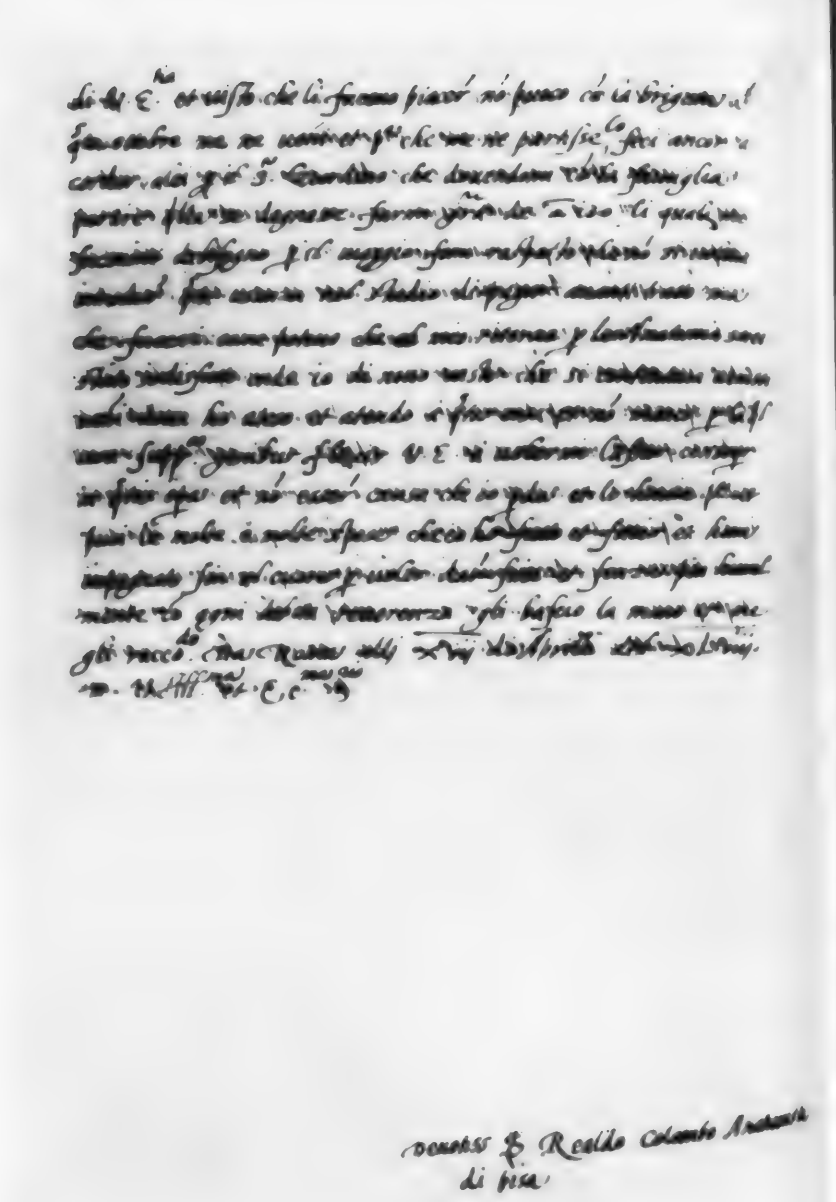

Fig. 2

Letter from Realdo Colombo to Cosimo I (verso). The only autograph of Colombo known at present.

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Introduction

The shadow cast by Realdo Colombo of Cremona upon the pages of medical history has always been somewhat obscured by that of his famous preceptor, Andreas Vesalius, whose epoch-making *Fabrica*, which appeared in 1543, was the first modern work on anatomy. Colombo, the author of *De re anatomica libri XV* (1559), is best known as one of the "discoverers" of the pulmonary circulation, and in this connection is usually mentioned together with Michael Servetus. In 1553, six years before Colombo's book appeared, Servetus had published his own account of the lesser circulation in a theological tract, the *Christianismi restitutio*. During the past one hundred years much has been made of the close approximation of the dates of these two works, investigators in this field having been led into attempts to prove or to disprove the charge of plagiarism on the part of one or the other of the two "discoverers." The controversy reached the proportions of an international struggle taking the form of an exchange of polemics between Tollin and Ceradini during the last years of the nineteenth century. The battle was waged with ever-increasing fervor until the opponents on each side, reaching a stalemate, were forced to retire into their own chauvinistic camps. As the field was cleared, it became apparent that the evidence for plagiarism on either side was at best speculative. It is now believed that Colombo and Servetus attained their knowledge of the pulmonary transit independently. All the elements necessary for the discovery of the pulmonary circulation were present in Italy at the beginning of the sixteenth century, many of them with their roots in antiquity. It is obvious, then, that the time was ripe for the discovery of this phenomenon, and that had not Colombo or Servetus come upon it, the idea would have occurred to someone else. The important point is not who deserves priority, but how the discovery came about. This paper represents an attempt to answer the latter question.

There does not exist any "biography" of Colombo, and the facts of his life have been, until now, little known. What information could be had was scanty and was often either incorrect or erroneously interpreted. I have tried to remedy this situation by drawing together what little is already known and by adding to it further material from original sources.

A pupil of Colombo, and his prosector, was Juan Valverde, an anatomist about whom not much is known. Valverde, in 1556, published a book on anatomy in Spanish in which he set forth the concept of the pulmonary circulation, acknowledging Colombo as his inspiration. The book was translated into Italian in 1559 (the same year that *De re anatomica* was

published) as *Anatomia del corpo humano*. It seemed that the ideas expressed in Valverde's book would be of use as a means of illuminating the well-known account by Columbo. I have therefore translated and included in the text of this study those passages in Valverde's *Anatomia* which to me seemed pertinent.

It is now known that Servetus and Colombo were not the first to conceive the idea of the pulmonary circulation. Three hundred years earlier, an Arab physician in Damascus, Ibn an-Nafis, had described in unequivocal terms the motion of the blood through the lungs. It formerly had been assumed that the description of Ibn an-Nafis had been forgotten and had remained unknown to the West. However, we now know that some works of Ibn an-Nafis were translated by Andrea Alpago of Belluno, whose nephew and close companion, Paolo, was a contemporary of Colombo. It has recently been suggested that the account of Ibn an-Nafis may thus have reached the West, if not in manuscript or printed form, then possibly by word of mouth. In the last chapter we shall see that this could, indeed, have been the case. It therefore seems indicated that further research should be directed towards attempting to uncover evidence, possibly among the extant manuscripts of Andrea Alpago, of a more definite connection between the ideas of Ibn an-Nafis and those of Colombo.[1]

I

A Biography of Realdo Colombo

About Realdo Colombo's early life little is known, the exact date of his birth never having been fixed, but we shall see later that the approximate year of his birth may be inferred from certain facts mentioned in his book. Colombo, the son of an apothecary, was born in Cremona, a city in the Milanese. As a youth he pursued the study of philosophy and the liberal arts at Milan,[2] and apparently not content with following in his father's footsteps, he soon turned his attention to the study of surgery. At that time surgery, which formerly had been practised by barbers, gradually was beginning to acquire university rank, but one could become a surgeon without first acquiring a formal academic degree. Colombo's father had been retained as apothecary by one of the most able surgeons

[1] Dr. Owsei Temkin has already concluded that Servetus "had no knowledge" of Ibn an-Nafis, and that he arrived at his concept of the pulmonary circulation independently. (*Bull. Hist. Med.*, 1940, *8*, 731-734).

[2] Papadopoli, p. 318.

in Venice, Giovanni Antonio Plato,[3] and this circumstance proved to be a most fortunate one for Colombo, because after returning from Milan he apprenticed himself to the eminent surgeon. He was to remain with Plato for seven years,[4] acquiring during this period a considerable mastery of the secrets of the surgical art.

In 1540 Colombo went to Padua in order to enroll himself in the medical faculty there. It was not impossible then for medical students to give lectures in the liberal arts while attending their regular medical course. Thus in the registrar's list of professors for the year 1540 we find Colombo listed as teaching sophistics.[5]

Vesalius must have been impressed with Colombo's surgical skill because soon afterwards he chose him to be his prosector. In this capacity Colombo was most diligent, and the relations between the two men at that time appear to have been very friendly. In the *editio princeps* of the *Fabrica*, Vesalius referred to him as "mihi admodum familiaris Renaldus Columbus, nunc sophistices apud Patavinos professor, Anatomes studiosissimus."[6]

Vesalius, up to that year, besides performing his incidental anatomical duties, also had held the first and second chairs of surgery, but his prosector had gained great favor with some of the university authorities, among them a certain Joannes Antonius Schilinus. Accordingly, Schilinus, on the 10th of August, 1541, was able to get Colombo elected to the second chair of surgery, thereby replacing Vesalius.[7] Colombo was to have occupied his new post at the beginning of the academic year in November. However, Vesalius appears to have had great influence with the Venetian Senate for on October 17th of the same year the appointments made by the university were approved by the Senate "in all parts, but not in that part where mention is made of the second chair of surgery

[3] Portal, p. 440. Plato sometimes called himself Plazzi, but his family name was Lonigo, in Latin, Leonicus. He was, according to Scardeonius (*Hist. de urbis Patavi antiquitate in Graevius Thesaur. antiq.* VI, iii, 248) a pupil of the surgeon Dominicus Sennus; see Roth, p. 9, footnote 3, who mentions a 1536/37 Vienna MS which contains a treatise on anatomy by "Jo. Ant. Leonicus (Platus)."

[4] ". . . prudentissimo, ac doctissimo aetatis nostrae chirurgo Ioanni Antonio Plato cognomento Lonigo, quo praeceptore septennium usus sum, adeo ut quantum in hac medendi arte profecerim: me nunquam poenitere possit." Colombo, p. 24.

[5] Tomasini, pp. 336-337. "Professores Sophisticae ab anno 1500 ad 1653. 1540: Ioannes Cavius Britannus, Realdus Columbus Cremonensis."

[6] Vesalius, 1543, p. 56.

[7] "Et per D. Joannem Antonium Schilinum electus fuit Ex[s] D. Realdus Columbus: de Cremona:" Archivio Antico Universitario di Padova. 28 Atti dell' Università Artista. 1434-1436. 1531-1557. R. M. p. 79, B, a.

to which D. Realdus Columbus of Cremona was elected, for we wish for the present that only D. Andreas Vesalius should lecture in surgery, for which he was commissioned by the Senate, but if at some other time the occasion arises we will not fail to satisfy those admirable scholars."[8]

The following summer, 1542, Vesalius wrote to his printer, Oporinus, that he was planning to journey to Basel in order to supervise the printing of the *Fabrica*.[9] He subsequently did leave Padua toward the end of 1542, and we know that he appeared at Basel in January of the following year.[10] The rectors of the university apparently had not anticipated Vesalius' absence, and had made no arrangement for the teaching of surgery and anatomy while he was away. There was no money available for formally hiring a substitute, and consequently they were obliged to resort to a makeshift plan. On January 19, 1543, Colombo, who had been teaching sophistics and prosecting for Vesalius, was commissioned temporarily to teach anatomy in Vesalius' place with the stipulation that he should receive for compensation the salary usually granted to the professor occupying the second chair of sophistics, a post which was then vacant.[11] It was up to Colombo himself to collect his fee from the students since the university could not officially transfer the payroll from the department of sophistics to the department of anatomy. Colombo must have been very pleased with this unexpected stroke of luck which permitted him to enter the limelight. He would have been an unusual man for his time had he not taken the opportunity to magnify his own reputation. Indeed, we know of one public demonstration in which he boasted of having outdone his teacher, and when Vesalius returned to Padua at the end of 1543,[12] the affection which he at first had felt for his pupil began to cool. In 1546, Vesalius, discussing a vein between the stomach and spleen, expressed himself about as follows:

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[8] ". . . confirmamus atque approbamus in omnibus partibus, sed non in ea parte ubi fit mentio de secundo loco Chirurgiae ad quem electus fuit D. Realdus Colombus de Cremona, namque volumus solum D. Andream Vesalium pro nunc lectionem Chirurgiae legere ad quam per Senatum deputatus est cum autem alio tempore venerit occasio non deeremus satisfacere illis spectabilibus scolaribus . . ." Archivio Antico Universitario di Padova, Registro no. 665, c. 3 Iv.

[9] Cushing, p. 77.

[10] *Ibid.*, p. 78.

[11] ". . . obtentum fuit quod Ex[s] D. Realdus Columbus deputatus ad Incidendam anatomiam habere debeat pro computo eius mercedis incidendi omnes pecunias quae exigebantur pro secundo loco sophistarie nunc vacantis:" Archivio Antico Universitario di Padova. 28 Atti dell'Università Artista 1434-1436. 1531-1557. R. M. p. 102a.

[12] Cushing, *op. cit.*, p. 156.

An uneducated man, a half knower, who learned something from me about anatomy has seen me several times search in vain for this duct in public dissections and has had my preparations before his eyes. During one dissection which took place in my absence he boasted that he had found the vein unknown to me.[13]

In the second edition of the *Fabrica* (1555), the reference to Colombo as "mihi admodum familiaris . . ." did not appear.

Vesalius did not remain long at Padua and within a month or two he left the university for the last time to join the court of Charles V,[14] stopping on the way at Bologna and Pisa to perform some public dissections.[15, 16, 17] Colombo continued to teach at Padua for the remainder of the year 1543-44. On October 24, 1544, as the university was preparing to open for the fall term, Colombo achieved the height of his academic ambitions when the Venetian Senate, by a vote of 112 to 5, elected him to succeed Vesalius as lecturer in surgery and anatomy.

Master Andrea Vesalius, our reader in surgery and anatomist, having left our School of Padua, we find it necessary to provide another expert and good doctor to continue in these positions, and having good accounts of Master Realdo Colombo of Cremona, Doctor, who has practised these arts for a long time, particularly in place of the said Master Andrea during the time he was absent, we decree as follows:

That the aforesaid Master Realdo Colombo read, regularly for two years in our School of Padua, the course in surgery with the obligation of dissecting each time the anatomy course is taught; that he be at our disposal for one year; and that he be assigned a salary of seventy florins per year.[18]

Colombo did not stay at Padua for the two years required, but went to Pisa that very same year to perform public dissections at the newly reopened university.

Not all the universities of Italy had fared as well as Padua, and especially was this true of Pisa. In 1473 Lorenzo the Magnificent had the Studio Fiorentino transferred to Pisa in an attempt to instill new life into the university there, and under Cosimo I the economic and intellectual

[13] "Ein ungebildeter Mensch, ein Halbwisser, der von mir etwas in der Anatomie gelernt hatte, sah mich mehrmals bei der öffentlichen Zergliederung jenen Gang vergeblich suchen und hatte dabei meine Präparate vor Augen. Bei einer während meiner Abwesenheit verrichteten Anatomie prahlte er, die mir unbekannte Vene gefunden zu haben." Roth, p. 182.

[14] Cushing, *op. cit.*, p. 158 ff.

[15] *Ibid.*, p. 157 ff.

[16] Corsini (1915).

[17] Corsini (1918).

[18] Archivio di Stato di Venezia, "Senato Terra," registro 33, carta 128v.

resources of the University of Pisa became strengthened. A dormitory was built to accommodate forty students, and, with the completion of the Sapienza, the university was reopened on November 1, 1543. Of all the arts and sciences, medicine and surgery were Cosimo's favorites, and he realized that their further progress would rest on careful anatomical study. He therefore introduced a statute in the following terms organizing the teaching of anatomy at Pisa:

> The inspection of those things which are hidden in the human body is most useful and necessary to those who wish to attain perfection in the art of healing. For who would know the correct or perfect remedy for those internal weaknesses and diseases which are hidden within, away from human sight? Therefore, considering the health of the whole human race, we decree that, each year in the wintertime, the Rector shall be bound to see to it, as carefully as he can, that two cadavers are secured, on which Anatomy can be demonstrated, one male, one female, if they can be secured handily; if not, at least the one. Moreover, that this may be accomplished more easily, we command that the Commissioner of Pisa be bound to assign to the Rector the said cadavers of some criminals who are to be put to death, whenever the Rector requires. But if no such criminal happens to be at Pisa towards Anatomy time, then let the Rector write to Florence to the Eight Masters of the Guard and Authority to this end, that the said cadavers may be had advantageously. There are those who declare that Anatomy cannot be practised on the body of any citizen of Florence, or Pisa, or of any Doctor or Scholar, without the consent of the nearest relations to it. Still, so that no uproar may arise about the said Anatomy, and that all may proceed in an orderly fashion, we decree that two scholars be chosen by the Rector and his Assistants, two scholars who are capable in the matter, who have studied in some General Study in Arts, and Medicine, for at least four years, and who, if possible, have seen Anatomies before. Let them be called "Anatomistae." [19]

Although Vesalius, before joining the court of Charles V, had stopped at Pisa in 1543 and had performed a public dissection there, the first of these "anatomistae" to occupy the chair of anatomy at the newly reorganized university was Realdo Colombo. According to Fabroni, Colombo reached Pisa for the first time in 1545, but this is not in agreement with the facts.[20] Valverde twice mentions that he had seen Colombo in Pisa in 1544. Thus in his chapter on the ribs is found the following passage:

> Similarly the chest has twenty-four ribs, twelve on each side; and sometimes (but very rarely, which I have seen only in one woman, in Pisa, in 1544 while Realdo Colombo was doing anatomy) there are thirteen on one side.[21]

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[19] Fabroni, p. 73 ff.
[20] *Ibid.*, p. 74, ". . . ad nos venit exeunte an. 1545."
[21] Valverde, *op. cit.*, *l.* 12b.

And again in the book on the arteries:

Having thrown off this branch this artery remains equal to that which we have said mounts on the left side, next to the trachea, taking the same path, and both being called by the same name, that is Carotids, or Soporals, which means Somnolent, or which induce sleep; because when they become obstructed or close in whatever way, immediately we go to sleep. Which experiment I saw Realdo Colombo do in Pisa in the year 1544 in a young man, before many gentlemen, with not less fright on their part, as laughter on ours, giving them to understand that such a thing was being done by means of an enchantment.[22]

When he had been appointed to succeed Vesalius at Padua, Colombo undoubtedly was aware that a new department of anatomy was being formed at Pisa and that no one had yet been found to occupy the first chair. After having done the public dissection that winter at Padua during the carnival season, he must have gone to Pisa around Christmastime to perform another dissection before the Florentines. It was there that he probably encountered Valverde and performed the "enchantment" which Valverde described. There subsequently developed a friendship between Colombo and Valverde which has an important bearing on the history of the discovery of the pulmonary circulation. Valverde, whose book appeared at Rome, described the pulmonary transit in 1556, and gave credit for the idea to Colombo who, three years afterwards, in 1559, published his own description, one which, unlike Valverde's, was set forth in bold and unequivocal terms.

We have indisputable proof that Colombo remained at Pisa during the New Year holidays. On January 15, 1545, a woman called Santa di Mariotto Tarchi di Mugello was condemned to death by Cosimo I for killing her two illegitimate infants by suffocation, and was sent to Pisa to be anatomized.[23] In the sixth book of *De re anatomica* Colombo tells of a dissection in which he demonstrated the uterine veins.

Through them the menses are purged as very often I have seen with these eyes in certain women who perished by a violent death while as yet the menses were flowing in them; nor in these only but also in certain others in whom they were approaching and would soon flow, and this occurred in particular in Pisa when I

[22] Valverde, *op. cit.*, *l.* 128.

[23] "Nel 15 gennaio 1545 fu condannata a esserle mozzo il capo Santa di Mariotto Tarchi di Mugello e moglie di Bastiano Lucchese tessitore de ermisini, per avere partorito due bamini e dipoi affogati. Nella deliberazione del magistrato si legge che confessò d'averli partoriti vivi e soffocati, mettendo lor la mano alla bocca affinchè morirono, e lo fece, perchè detti figli erano nati da coito illecito. E sotto la deliberazione si legge 'Dicta Santa di mente Excelli[mi] Ducis fuit missa Pisis, ut de ea per doctores fieret notomia.'" Andreozzi, p. 50.

dissected a woman of that sort in the public theatre in the presence of a great number of students and doctors. The woman whose anatomy I demonstrated was named Sancta, and a month earlier she had given birth to twins which unfortunate creatures had scarcely come into the light when she deprived them of it by suffocation, and the just judges ordered that she too be suffocated, for as the poet said

> There is no law more just
> Than that murderers perish by their trade.

Therefore in this woman named Sancta, but in truth a demoniac and sorceress, veins of this sort, which in others are not usually very large, were very noticeably black and therefore easily seen. Wherefore from the cadaver of Sancta the spectators were able to understand through what veins the menses flow and that they do not cross through the uterus.[24]

It is clear that this Sancta was the same woman who had been condemned to death by Cosimo I. Valverde confirms the date of this dissection in the third book of his *Anatomia* wherein he speaks of the uterus:

The substance of this tunic is interwoven with some thin veins, like hairs, which are seen seeded throughout it; which until now I have not seen swollen (as some say) in any woman who was not pregnant; unless she died having her menses, as I saw in Pisa in 1545 in a woman who had murdered her son in Florence, and for this the Duke Cosimo de Medici condemned her to be anatomized.[25]

It is probable that during his visit to Pisa in the winter of 1544-45 Colombo was invited to assume the duties of the first chair of anatomy there for the next academic year. We know that he accepted the post, and in the fall of 1545 he became the first full-time teacher of anatomy in the University of Pisa.[26] During the two ensuing academic years 1545-47 Colombo appears to have remained at Pisa fulfilling his obligations as teacher of anatomy. However, in the summer of 1547 he asked permission from the Duke to go to Rome. This permission Cosimo willingly granted on August 8th.

We are very happy that Realdo should go to Rome because he wishes to go for such an honorable reason and from the result that must follow we will derive that pleasure which inevitably comes from having virtuous and ambitious men to teach for us. But we wish that he should not neglect to be in Pisa at anatomy time to fulfill his obligation for the service of the scholars, as we are certain he will not neglect to do . . .[27]

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[24] Colombo, *op. cit.*, pp. 173-174.

[25] Valverde, *op. cit.*, *l.* 90a.

[26] Fabroni, *op. cit.*, p. 74.

[27] " Che'l Realdo vada a Roma siam molto contenti poichè vi vole andare per causa così honorata et dell'effetto che di questo ne debbe seguire ne riceveremo quel contento che

Colombo did not neglect his "obligation for the service of the scholars." He returned to Pisa in the winter of 1547 in time to perform the public dissection and to attend to his anatomical lectures. But after the course in anatomy was finished he went back to Rome with the intention of remaining there. On April 17, 1548, he wrote from Rome to Cosimo:

Most Illustrious and Most Excellent Duke:

I have always made an effort whenever I could to do something pleasing and worthy in order to give satisfaction to Your Excellency, and having imagined that it was in my power to do a welcome thing for the common good of all those who wish to know about the composition of the human body, I have been laboring over, and am now working hard at composing a work which will give them the truth of the matter and which may be studied in conjunction with dissection. I know the damage they suffer from studying Galen who, besides being lengthy, is also in error; similarly Vesalius is prolix and suffers from not a few errors, as I have demonstrated many times in public and as I am about to demonstrate more widely if Your Excellency does not prevent me. Considering this, I turn to Your Excellency to pray that you deign to give me leave to take up quarters in Rome because *as luck would have it the leading painter in the world is assisting me in this*, and because the supply of bodies, which it is necessary to have at hand almost continually to evaluate things well, is plentiful here; all this in order to have evidence to contradict the ancients and moderns alike. Your Excellency, having considered the good that must result from this, grant me, benignly, as is your custom, ample leave that I may go. I shall not neglect to be present in Pisa during the time of the anatomy course in order to fulfill the purpose for which I am retained in the Studio and which I believe I have observed and practised during the required time. When I finished teaching the anatomy course last year, I returned to Rome with Your good leave and that of messer Lelio in order to pursue my dissections and supervise the painters. At this writing a great deal already has been done, and this coming summer we will attend to the bones. Wherefore, Your Excellency can see that I have always tried to please him.

Now I have had a letter from Signor Giordano Ursino who notifies me that Your Excellency is dissatisfied with me for staying away, and that the Studio is neglected. I answer that the Studio does not at all suffer because of me since I have done there as much as was required of me this year. As for the rest, I say that I did not mean to leave without the express permission of Your Excellency. And because my family wanted very much to accompany me this October I took them with me [to Pisa], but before I left I had you reminded through Signor Giordano that since I was taking them would he deign to favor me with 100 ducats which

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si debbe pigliare dal comodo che ne han da havere i virtuosi et desiderosi d'imparare. Vogliam però che al tempo del far ea notomia non manchi di ritrovarsi a Pisa a far quanto è il debito suo per servitio delli scolari, come noi siamo certi che non mancherà, e come voi a nome suo per la vostra mi fate intendere . . ." Letter from Cosimo I to Rector of University of Pisa, August 8, 1547. Archivio di Stato di Firenze, carteggio Mediceo, filza 10, carta 342.

I needed for traveling expenses. I was answered that they did not wish to introduce into the Studio this habit of paying in advance, but that I should do as best I could and that on my return to teach anatomy I would be recompensed. Whereupon, seeing that my family would be pleased to come with me, I brought them [to Pisa] where I attended to, and am attending to, this matter and do not neglect it. Therefore I beseach Your Excellency, *genibus flexis*, to let me continue in this work and not cause me to lose first my honor and second the many expenses I have incurred and am now incurring. I have pledged myself with all my heart to finish this task. With nothing further, humbly and with all due reverence I kiss your hand and commend myself to you.

From Rome on the 17th of April of '48.

Your Most Illustrious and Most Excellent Lordship's
Most Devoted Servant,
Realdo Colombo, anatomist of Pisa.[28]

The reason why Colombo, during the summer of 1547, first had asked to go to Rome now becomes apparent, and we can readily understand the munificence of Cosimo's reply. Colombo, under the enlightened patronage of the Duke of Tuscany, had begun to write a book on anatomy which would not only correct the errors of Vesalius but would surpass the *Fabrica* in magnificence because the illustrations were to be done not by Calcar, but by the man who had conceived the dome of Saint Peter's, Michelangelo Buonarotti, the "leading painter in the world." Vasari tells us that Colombo was Michelangelo's "friend and physician,"[29] but binding the two men even more closely together was their mutual interest in anatomy. Michelangelo had himself thought of composing a book on anatomy which would be useful to painters and sculptors, and it is not surprising, then, that the two were projecting a major anatomical work. The reason why it never was executed is simple. In 1548 Michelangelo already was seventy-two years old. Condivi's account,[30] written five years later, is most interesting:

Many times he [Michelangelo] had in mind to produce a work for the service of those who wish to work in sculpture and painting, which would treat of all the possible human motions and appearances, and of the bones, with an ingenious theory that he had discovered and was accustomed to use, and he would have done it if he had not suspected that he did not possess enough strength to do such a thing with dignity and honor . . . And because he is now of a grave and mature age, and does not think he is able to show this dream of his to the world in writing,

[28] Archivio di Stato di Firenze, Carteggio universale di Cosimo, filza LVI, carta 258. This is at present the only know autograph of Colombo (italics mine).

[29] Vasari, p. 221.

[30] Condivi, pp. 175-177.

he has told me everything. He even began to confer with messer Realdo Colombo, a most excellent anatomist and surgeon, and a very close friend of Michelangelo and myself; who for that reason sent him the dead body of a Moor, a very beautiful young man and very well proportioned beyond words, and he was brought to Santa Agata, where I was living and still live, since it is a remote place; on this body Michelangelo showed me many rare and secret things perhaps never before heard of . . .[31]

It is probable that in Condivi's apartments in Santa Agata, Colombo and Michelangelo were accustomed to dissect together in private, making notes for the great work which would, unfortunately, never be realized.

Little trace remains of Colombo's activities in the years following 1548. On September 6, 1548, Gabrielle Falloppio wrote from Ferrara to the Duke's secretary, Giovanni Francesco Lottini, that he would be in Pisa the next month to assume the duties of dissecting and teaching anatomy,[32] thus replacing Colombo. Meanwhile, in Rome,[33] Colombo took on the teaching of anatomy at the Sapienza in the fall of 1548, although his name does not appear in the rolls of the university until 1559, when he was teaching with a stipend of 22 ducats.[34] However, we know that he began teaching in the Sapienza at Rome in 1548 from a passage in his book on the muscles:

Often I saw myself surrounded by three hundred or more auditors in the academies at Padua and Pisa, and finally at Rome where I have now been teaching for ten years.[35]

The imprimatur of *De re anatomica* was granted on October 21, 1558,[36] and we know that Colombo did not leave Pisa for good until the early part of 1548. If we are to believe him, then, he must have been teaching in Rome in the fall of the same year in which he left Pisa, and it was ten years later that the book on the muscles was written. The last piece of official evidence concerning Colombo's exact whereabouts may be found in the proceedings of the papal conclave of 1550. During this event Colombo was retained as one of the surgeons to the Pope, Julius III.[37]

There has been a great deal of confusion during the past two hundred

[31] Could one of them have been the way of the blood through the lungs?

[32] Letter from Gabrielle Falloppio to Giovanni Francesco Lottini, September 6, 1548. Archivio di Stato di Firenze, Carteggio universale di Cosimo, filza 390, fol. 61.

[33] Colombo could not have been called to Rome by Pope Paul IV as most biographical dictionaries maintain, because Paul IV did not ascend to the chair of Peter until 1555.

[34] Marini, vol. I, p. 372.

[35] Colombo, *op. cit.*, p. 139. ". . . &Romae denique, ubi iam decem annos profiteor . . ."

[36] Archivio di Stato di Venezia. Reformatori dello studio di Padova, Busta 284, n. 171.

[37] Marini, *op. cit.*, p. 392.

years as to the exact year of Colombo's death, it being given as 1559, 1564 and 1577 by different authors.[38] The correct date is 1559. The two errors were made originally as the result either of misreading or of misinterpreting two epitaphs, both of them having to do with Colombo, but neither of them his. In 1577 one of Colombo's sons, Lazaro, erected the following inscription in Latin to his wife in the church of Santa Maria del Popolo in the middle nave just inside the great Flaminian door:

> To Marcia Juliana of Cremona, remarkable for her great devoutness toward God and the Virgin Mother of God, for her piety, and for her love of her neighbors, excellent in frugality, chastity, gentleness of habit, and all other endowments of soul and body, to his richly deserving wife, Lazaro, son of the famous surgeon, Realdo Colombo of Cremona, and himself a surgeon, erected [this tablet]. She lived 40 years, and died July 1, in the year of Grace 1577.

This epitaph was correctly transcribed and interpreted by Arisi, and in 1705 it was published in his book on Cremonese authors.[39] Arisi apparently did not himself compile the index to his book because under "inscriptiones sepulchrales" appears the entry: "Realdi Colombi 169" with Colombo's name in the genitive case. What must have happened is obvious. Someone later searching for the date of Colombo's death must have come upon the entry in the index, and on turning to page 169 must have copied the date 1577 without ever having read the epitaph. The mistake was then repeated by other writers who failed to return to the original source.

The second controversial epitaph is a tablet in the church of Santa Maria dei Servi in Padua. It is dated 1564 and bears a dedication to Colombo's son, Epiphanio, by the *parentes maestissimi* of the deceased. The word *parens* may mean either parent or kinsman, while in Italian, *parente* means only kinsman. Papadopoli[40] in 1726 chose to believe that the *parentes maestissimi* who had erected Epiphanio's tablet were most sorrowful *parents*, and that Colombo therefore must have been alive when the tablet was erected in 1564. Actually, the meaning in this case must have been, as we shall see, most sorrowful *kinsmen*. This error was easily perpetuated since Papadopoli is most widely quoted as a source of biographical information about Colombo. The truth lies in any copy of *De re anatomica* that contains the dedication by Lazaro and Febo to Pius IV, written in 1559. Here the two sons state explicitly that they

[38] Haller, p. 214. Haller gives the year 1577. "Obiit anno demum 1577."
[39] Arisi, p. 169.
[40] Papadopoli, *op. cit.*, p. 318.

wish to place their father's book under the protection of the Pope so that the memory of their "most blessed dead father Realdo" might live again.[41] Colombo was too well known in Italy for his sons to have lied.

We shall conclude this biography of Colombo by inferring the approximate date of his birth, within a few years, from the known facts. Colombo first went to Padua to study medicine in 1540. Since the course in medicine at that time required four years of study, he must have received his medical degree in 1544, the same year in which he succeeded Vesalius as professor of surgery and anatomy. We know that previously he had spent four years in Milan where he probably received the baccalaureate and license, and that he was afterwards, before going to Padua, for seven years a protégé of Plato from whom he learned the art of surgery. He therefore spent at least fifteen years in the study of medicine, surgery, and the liberal arts. This means that he must have gone to Milan about the year 1529. Since it is highly improbable that Colombo should have entered on such a course of study before he was ten or twelve years old, he must therefore have been born not later than 1515 or 1517. If we assume that he was a precocious youngster, we are on safe ground in concluding that the span of Colombo's life, until further evidence is uncovered, properly may be given as 1515(?)-1559.

II

The Idea of the Pulmonary Circulation in Colombo's *De Re Anatomica* and Valverde's *Anatomia*

The first description of the pulmonary circulation to appear in print in the West (1553) was that of the Spaniard, Michael Servetus. Servetus had studied anatomy at Paris together with Vesalius under Winter of Andernach. His primary interest was theology, and because of his heterodox beliefs, which he refused to relinquish, Calvin had him burned at the stake on October 27, 1553. His description of the pulmonary circulation appeared in a theological work, the *Christianismi restitutio*. The printing of the book, of which only three known copies have survived, was completed in secret on 3 January, 1553, but there is evidence that the *Restitutio* probably had been circulated in manuscript form in 1546.

The priority of Servetus' description (1553) over that of Colombo (1559) cannot be disputed. Many scholars have attempted to show some connection between the two, various bits of circumstantial evidence being

[41] ". . . beatissime Pater Realdi demortui . . ."

given to support the view that one plagiarized from the other. The present opinion is that the discovery was made independently by each man.[42] The view of those who maintain the independent discovery of the pulmonary circulation by Colombo is summed up by Sarton:[43]

> Comme la *Restitutio* fut à peu près complètement détruite en 1553, il est certain que les anatomistes du XVI^e^ siècle ne purent l'utiliser. D'ailleurs, même si le livre avait été accessible, il est peu probable que les anatomistes y auraient trouvé la découverte physiologique cachée dans un farrago théologique condamné par les Églises.

After Servetus' description, the next to appear was that of Valverde (1556). Addressing himself to Giovanni da Toleto, Valverde maintained that "all that is useful that will result from this book of mine, is not less to be attributed to Andreas Vesalius, than to Realdo Colombo, my preceptor in this faculty."[44] Valverde did not claim originality, and we are on safe ground in assuming that his debt to Colombo was a real one. His ideas concerning the pulmonary circulation must have been derived from his teacher, and they probably represent Colombo's views as he (Valverde) interpreted them. The third account was Colombo's own. It appeared in *De re anatomica* in 1559, and it will be considered later in more detail.

The way for the discovery of the pulmonary transit had been prepared some time before Colombo published his observations. We know from the Windsor manuscripts that Leonardo had been a diligent student of anatomy and that he had studied the functions of the valves of the heart. But his physiology remained Galenic:

> In this mesentary are planted the roots of all the veins, which unite at the gate of the liver and purify the blood in the liver; it then enters the vein of the chyle, and this vein goes to the heart and makes purer the blood which penetrates in the arteries as spirituous blood.[45]

Soon afterwards, Berengario da Carpi (1522) accurately described the anatomy of the heart, but his physiology followed that of Mondino, who was also a Galenist. According to Vesalius it was Canano (1515-79) who first described the valves of the veins.

The ideas of Vesalius concerning circulatory physiology are of considerable interest. In the main he subscribed to the teachings of Galen, but there was one point about which he was uncertain: the permeability

[42] Bainton, p. 121 ff.
[43] Sarton, 1954, p. 151 ff.
[44] Valverde, *op. cit.*, *l.* A3.
[45] MacCurdy, p. 112.

of the interventricular septum. Galen considered the pits in the wall of the septum of the heart to communicate through the wall, by invisible pores, with the ventricle of the opposite side. It appears that Vesalius was the first of the Renaissance anatomists to doubt the existence of these communications. In the first edition (1543) of the *Fabrica* he wondered at the handiwork of the Almighty who permitted the blood to sweat through openings which were invisible to the human eye, but he nevertheless agreed with Galen that the blood "soaks plentifully through the septum from the right ventricle into the left."[46] In the second edition (1555) this reference did not appear. Instead he wrote that the blood "is thought to soak plentifully through," and in the same edition he elsewhere maintained:

> I still do not see how even the smallest quantity of blood can be transfused through the substance of the septum, from the right ventricle to the left.[47]

Thus, one year before Valverde's description appeared, a serious doubt had been raised in print concerning Galen's concept of the movement of the blood.

Valverde's views on the possible existence of communicating pores in the septum of the heart were unequivocal. He had observed that the septum was dense and hard, as was the muscle of the left ventricle. If the blood within the left ventricle did not soak out through the thick walls of the ventricle, why then should it be able to pass through the dense septum from one ventricle to the other? To conclude that it did was contrary to the senses.

> . . . the partition, like the rest of the substance of the heart which the left [ventricle] forms, is hard, thick, and strong, as we have said the heart to be, except at its beginning where, on account of the vessels which are born there, it was forced to be not so hard, and that part which the right ventricle forms is thinner and more tender. But the [surface of the] partition between the ventricles is somewhat irregular by reason of some rivulets or sulci which are made in the substance of the heart, and they are much more manifest in the left ventricle than in the right; *but no blood passes from one ventricle to the other, as they say who have written of it until now.*[48]

From this passage it is clear that Valverde recognized the impermeability of the septal wall, and that, unlike Vesalius, he did not merely question it. Undoubtedly he had apprehended the idea from his preceptor, Colombo, whose view was equally unequivocal.

[46] Vesalius, *op. cit.*, p. 598.
[47] *Ibid.*, 1555, p. 734.
[48] Valverde, *op. cit.*, *l.* 105b (italics mine).

Between these ventricles there is a septum through which almost everyone believes there opens a pathway for the blood from the right ventricle to the left, and that the blood is rendered thin so that this may be done more easily for the generation of vital spirits. *But they are in great error, for the blood is carried through the pulmonary artery to the lung and is there attenuated; then it is carried, along with air, through the pulmonary vein to the left ventricle of the heart. Hitherto no one has noticed this or left it in writing,*[49] and it especially should be observed by all.[50]

From what already has been said it is apparent that the doubt concerning the existence of the septal pores, originally raised by Vesalius, must have instituted a critical search for these communications which ultimately resulted in the denial of their existence by the senses. It was in this way that the experiential spirit of Leonardo, which had wanted to work miracles by exploring the realm of natural phenomena, was responsible for the discovery of a fact which helped to make possible the discovery of the circulation of the blood through the lungs.

Besides the recognition of the impermeability of the septum, there was another observation from which Valverde and Colombo derived their conclusion that the way of the blood from the right ventricle to the left was through the lungs. In the Galenic physiological scheme, in addition to the belief in the passage of venous blood from the right ventricle to the left across the septal wall, there was one other idea which made impossible the discovery of the pulmonary circulation before the Renaissance. This was the belief that the pulmonary artery and vein differed in the relative amounts of blood and air, or spirit, which they contained. This belief was dispelled once and for all by the conclusion of Valverde and Colombo that the pulmonary vein, like the other veins of the body, was devoid of gaseous air and was filled with blood. The two anatomists did not arrive at this conclusion hastily. Again and again Colombo, assisted by Valverde, opened the bodies of living animals and dead men in order to verify whether the pulmonary vein, contrary to what the "infallible" Galen had said, did, indeed, contain only blood and not air in the form of a vapor. It is a tribute to the genius of Colombo that in these researches he embraced the experimental method, and thus anticipated by fifty years Bacon's concept of the act of judgment. In Valverde's description of the pulmonary vessels we find the following:

According to all those who have written before me, the function of the pulmonary

[49] Thus both Colombo and Valverde state implicitly that they had not seen Servetus' description.

[50] Colombo, *op. cit.*, p. 177 (italics mine).

artery is that of nourishing the lungs, and the function of the pulmonary vein is to bring air from the lungs to the left ventricle of the heart, it appearing to them that there could not be blood in this vein under any circumstance. *But if they had experimented on this, as I have done many times with Realdo,* both in live animals and in dead ones, they would have found that this vein is no less full of blood than is any other vein. Nor can it be said that blood gains entrance to the vein after death because when one opens any living animal, so much blood is lost during the dissection that the heart tends to retain that which it has, without letting any escape. And if any blood should leave the heart, it is more reasonable that it should leave through the mouth of the aorta, through which it ordinarily goes out, than through any other vessel. Moreover, if you should open the heart quickly, scoop all the blood out of it, and then look into this vein, you will find absolutely without fail that it is full of blood. Now it being thus, that there is blood in this vein, and that the blood cannot enter there from the left ventricle, as the position of the valves at the mouth of the vein demonstrates, *I believe with certainty that the blood oozes from the pulmonary artery into the substance of the lung where it is thinned and prepared in order to be more easily converted into spirit. It is then mixed with air which, entering through the branches of the treachea, accompanies it to the pulmonary vein and thence to the left ventricle of the heart.* Here it is mixed with the somewhat thicker blood which passes from the right ventricle of the heart to the left, *if any at all does pass. I until now have not been able to see where it could pass through.* But if it should pass, from both these bloods *one material* is made, disposed to convert itself into the spirits which give life. This is my opinion, and *the senses confirm it,* because having presupposed that blood is found in the pulmonary vein, as whoever does not wish to put faith into my pronouncement can see for himself, it is necessary to say that from there it must go into the left ventricle. It is also more likely than to think that the vital spirit should be created immediately from the blood of the right ventricle of the heart, which is very little different from that of the vena cava, without being preceded by any other greater preparation. *But putting this aside, because it is outside my scope, it is enough to know that in the pulmonary vein, without any doubt whatsoever, there is blood in great quantity and not a little blood and much spirit, as those who have written before me affirm.*[51]

There is one statement in Valverde's foregoing description which might make us think, at first, that he still believed in the passage of venous blood from the right heart to the left heart through the septum. But this would seem not to be true. A perusal of Valverde's book will reveal that his writing, as we have seen, is, unlike the iconoclastic style of his teacher Colombo, literary, fluent, and always reserved and gentle in its criticism. We already know that in the passage describing the "hard," "strong" septum he maintained explicitly that "no [blood] passes from one ventricle to the other." When we read his reference to the "somewhat thicker blood which passes from the right ventricle of the heart to the left" in

[51] Valverde, *op. cit.*, l. 131 (italics mine).

that context, with the observation that it is immediately qualified at great length, it becomes apparent that Valverde was attempting to introduce the Galenist reader gently to such a novel concept. He did not wish to incur the hostility of other anatomists by a direct and dogmatic refutation of what was then "gospel" truth. Valverde had before him the example of the wrath which the Galenists let loose upon the *Fabrica* and which had caused Vesalius to forsake anatomy.

The history of man is not discontinuous, and it is a truism that the ideas of one age merge synthetically with those of the next. The development of an anti-Galenic consciousness was no exception to this rule. In spite of its great advance, the anatomy of Valverde still retained vestiges of Galenic lore. He, with Galen, regarded the heart as a "furnace" within which the vital spirits were generated.

> The Supreme Creator wishing to give us a more perfect life than that which plants and the other herbs have, it was necessary to create in our bodies a particular member in which, as in a forge, such virtues might be formed. And thus he provided us with the Heart, so necessary to life that there is not any animal, however small it might be, which does not have this member or something which resembles it. In this Heart are generated the spirits of life, therefore called Vital; the material of which is the vapor of the blood, together with a part of the air which we take in continuously through the nose and mouth while breathing.[52]

Valverde, like Petrarch, stood at the crossroad; he was midway between Galen and Harvey, and could see in either direction. His passage describing the trachea tellingly illustrates this position:

> This tube was made so that air might enter and leave the lungs through it; this air, entering, creates the spirits of life and, leaving, takes away, *according to what Galen says*, the soot of the heart.[53]

But Valverde's teacher, Colombo, explicitly denied in no uncertain terms Galen's doctrine of the excretion of sooty vapors by the trachea via the pulmonary vein:

> Anatomists imprudently write—may they pardon me—that its function is to carry altered air to the lungs which, like a little fan, make a breeze around the heart in order to cool it and not the brain, as it seemed to Aristotle. They believe that the lungs receive sooty fumes (I do not know what sooty fumes, for thus they speak in ignorance of tongues) sent from the left ventricle. This comment would not even be made except that some people are pleased to believe with certainty that such things occur in the heart as are usual in furnaces, as if in the heart there were green wood which gives off smoke when it burns.[54]

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[52] *Ibid.*, *l.* 102a. [53] *Ibid.*, *l.* 103b (italics mine). [54] Colombo, *op. cit.*, p. 178.

The Renaissance anatomist's enlightened questioning of the tenets of Galenic speculative physiology is further expressed by Valverde in a passage on the lungs:

> The principal function of the lungs is to receive air and to prepare it so that from it the spirits of life might be made (*if indeed they really are made*) . . .[55]

We have already mentioned that Valverde's principal reasons for concluding that the blood from the right ventricle must pass through the lung via the pulmonary vessels were the recognition of the fiction of the septal pores and the experimental demonstration that the pulmonary vein was always full of blood. To these arguments Colombo added three others. In the first place, the flesh of the heart possessed its own arterial blood supply. If the vital spirit were engendered within the heart itself, why, then, should the heart require to be nourished with spirituous blood from the coronary artery?

The second argument which Colombo brought to bear against the Galenic scheme was based on his clear understanding of the function of all the valves of the heart. Valverde, too, understood this function perfectly, but he did not explicitly enlist it as a major proof of the pulmonary transit as Colombo did. Colombo wrote as follows:

> But let us return to the aforesaid four vessels; two of them have been constructed so that they carry inwardly to the heart, that is, when the heart is dilated; but the oher two carry outward when the heart is constricted. Therefore when it is dilated, and those membranes are loosened and yield ingress, the heart receives blood from the vena cava into the right ventricle, and also prepared blood from the pulmonary vein, as we said, along with air into the left ventricle. And when the heart is compressed, these valves are closed lest the vessels receive anything regressing along the same path; and at that same time the valves of both the aorta and the pulmonary artery are opened; they permit the passage of the outgoing spiritous blood which is diffused through the whole body and of the natural blood which is carried to the lungs; and it is always thus when the heart is dilated, as we noted before: [that the] other [valves] open and then shut. And so you will find that the blood which has entered the right ventricle is unable to return to the vena cava.[56]

The third argument upon which Colombo called was not mentioned by Valverde. It is most interesting because it was based on an erroneous assumption. Colombo knew that the lungs contained arterial blood because he had observed that violent coughing could produce a blood-streaked sputum which was bright red and very unlike the dusky color of venous blood:

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[55] Valverde, *op. cit.*, *l.* 104b (italics mine).
[56] Colombo, *op. cit.*, p. 179 ff.

Physicians conjecture that blood exudes from the lung, and they know with certainty taught by long experience, not only that it may be brought forth by coughing but also that it is florid, thin, and beautiful, as we are accustomed to say of arterial blood.[57]

Colombo did not know of the existence of the bronchial arteries and believed that the lung was the only organ of the body not supplied with spirituous blood from the aorta; but without spirituous blood no organ could live. He therefore was forced to conclude that the lung was responsible for making its own spirituous blood:

I fear that this new function of the lungs which no one of the anatomists hitherto dreamed of must seem incredible and a paradox to the Aristotelians, whom I beg and ask that they consider the size of the lung which could not exist without vital blood, since there is no particle of the body, no matter how small, which lacks it. Furthermore, if this vital blood does not originate in the lungs from what part can it be transmitted except from the aorta? But from the aorta no branch large or small is sent to the lungs.[58]

One final thing must be pointed out in considering the idea of the pulmonary circulation as conceived by Valverde and Colombo. Their statements that the pulmonary vein brought "blood and air" to the left ventricle of the heart should not be misconstrued. They obviously were aware of the fact that the pulmonary vein did not contain "air" as a gas because in examining its contents they found repeatedly that it was full of blood. But they did believe that in the lung the inspired air was somehow mixed with the blood coming from the right ventricle and that this liquid mixture was then carried to the left ventricle via the pulmonary vein. Physically, they were quite correct in their conclusions. Arterial blood is indeed a "mixture" of air and blood in solution. We now know that the bright red color of arterial blood results not from the air which it contains, but from a part of the air, oxygen. In a certain sense Colombo and Valverde knew this too, with one important difference. What to us is oxygen was to them the "vital spirit."

In summary, we see that the doubt first expressed by Vesalius concerning the existence of the septal pores, and then reinforced by the renewed interest in dissection, eventually was declared a certainty by Colombo and Valverde. The establishment of this fact, and their knowledge that the pulmonary vein contained blood and not air, led them inevitably to the idea of the pulmonary transit, and thereby began a chain of events which was to culminate in Harvey's epoch-making discovery of the circulation of the blood.

[57] *Ibid.*, p. 224.

[58] *Ibid.*, p. 221.

III

A Possible Way by which Ibn an-Nafis' Theory of the Pulmonary Circulation Could Have Reached the West

It has been pointed out in the introduction that the accounts of the pulmonary circulation by Valverde and Colombo, and that of Servetus six years before, although the first to appear in print, were anticipated three hundred years earlier by the Damascus physician, Ibn an-Nafis. A comparison of Ibn an-Nafis' description with those of Valverde and Colombo reveals that there are certain striking similarities among these descriptions which seem to suggest more than a coincidental relationship. Two of these similarities are worthy of note. The first was the importance attached by all three men to the impermeability of the interventricular septum, and the second was the presentation of this fact as conclusive evidence that the blood must therefore reach the left ventricle of the heart via the lung. Thus, Ibn an-Nafis wrote of the septum:

> But there is no opening, as some thought there was between these two cavities, for the septum of the heart there is watertight, without any apparent fenestrations in it. Nor, as held by Galen, would an invisible opening be suitable for the passage of this blood, for the pores of the heart there are not patent and its septum is thick.[59]

We know that Colombo and Valverde too insisted that the septal wall was, like the muscles of the left ventricle, "hard," "dense," and "strong," and that therefore the venous blood could not penetrate it to reach the cavity of the left ventricle. Another point of great interest is that Ibn an-Nafis, Colombo, and Valverde all regarded the contents of the pulmonary vein as a *mixture* of air and blood, the formation of which was accomplished in the lung, thus preparing the blood for its final elaboration by the heat of the heart. On this point Ibn an-Nafis is explicit:

> But the view that the function of the arteria venalis is to transport nourishment from the heart to the lungs has been shown to be unfounded, since the function of this vessel is to transport the air already mixed with the rarified blood from the lungs to the left cavity of the heart.[60]

We are certain that Colombo, together with Valverde, reached the same conclusions on the basis of a knowledge of the impermeability of the septum, the functions of the heart valves, and the realization that the pulmonary vein was devoid of any gases or vapors. But the question that immediately arises is why did Colombo take such an interest in the con-

[59] Translation by E. E. Bittar, p. 433. [60] *Ibid.*, p. 436.

tents of the pulmonary vein, and what led him to open it "many times" in living animals and cadavers in order to satisfy himself that it contained only blood? In short, had he learned of the description of Ibn an-Nafis?

All the elements necessary for the rise of an anti-Galenic consciousness in the West during the Renaissance already were present in Italy, and this movement did not require any added impetus from the outside to bring it to fruition. However, it is equally true that the Islamic culture from the seventh to the fourteenth centuries was the custodian of classical Western thought during the Middle Ages. Much of the revival of learning took place through the transmission of classical writings from the East to the West, mediated largely by the extensive commercial activities of the Venetian merchant fleet. Could, then, the radical ideas of Ibn an-Nafis have reached the West in this way, either in manuscript form, in translation, or by word of mouth?

Raising this question in 1935, Meyerhof himself apparently answered it satisfactorily by saying, "As Ibn an-Nafis' works have not been translated into Latin, except one of his Commentaries, it is improbable that he exercised any influence on European medical thought."[61] The work to which he referred was a translation of a commentary by Ibn an-Nafis on the fifth canon of Avicenna which had appeared in 1547 in Venice as part of a "Latin edition" of Avicenna[62] by Andrea Alpago. In following years the matter was not mentioned further until recently when Professor John F. Fulton of Yale and Professor C. D. O'Malley of Stanford became interested in the possibility that the idea of the pulmonary transit nevertheless may have reached the West through the person of Andrea Alpago, who lived in the Middle East for thirty years collecting, translating, and editing the writings of many Arabic medical authors. A copy of the "Latin edition" of Avicenna, referred to by Sarton in 1931, was discovered by Professor O'Malley in the Lane Library at Stanford, but the particular work of Ibn an-Nafis which it contains, *Ebenefis philosophi, ac medici excellentissimi expositio super quintum canonem Avicennae,* "has no bearing at all upon the problem of the circulation."[63] There is, however, in this same collection of writings a treatise on the pulse entitled *Consideratio sexta de pulsibus assumpta ex libro Siraxi,* which Professor O'Malley feels "does possess some indirect significance in that it indicates a consciousness of some of the perplexities and illogical factors inherent in the Galenic scheme."[64] This treatise on the pulse consists in

[61] Meyerhof, p. 118.
[62] Sarton, 1931, vol. II, p. 1100.
[63] O'Malley, C. D. Personal communication to Dr. J. F. Fulton, April 25, 1954.
[64] *Ibid.*

part of some excerpts from Ibn an-Nafis, but there is no indication of their source. The excerpts are a series of problems presenting certain inconsistencies inherent in the Galenic scheme, together with the answers to these problems by Ibn an-Nafis. For instance, according to Galen, the heart in dilating attracts to it both air from the lungs and spirit from the arteries. If this were so, the size of the left ventricle would have to be much greater than it actually is in order to accommodate such a large amount of spirit and air, since it already contains much blood. Ibn an-Nafis' solution of this problem as well as his answers to other questions are unfortunately quite orthodox, but the important point is that such questions should have been raised at all. That they were even suggested would seem to indicate that in Ibn an-Nafis' time there was some dissatisfaction with the accepted Galenic idea of the motion of the blood. It follows that with the migration of Arabic learning to northern Italy in the fifteenth and sixteenth centuries such heterodox views also could have been transferred, and along with them the concept of the pulmonary circulation.

That Alpago had read some of Ibn an-Nafis' writings is apparent from the inclusion of the *Expositio super quintum canonem Avicennae* in the group of translations published in 1547. Further evidence in support of this view comes from Alpago's own foreword to his revision of a Latin translation by Gerard of Cremona of the *Canon* of Avicenna. This work, edited by Andrea's nephew, Paolo, was printed at Venice by the Giunta press in 1527. In his foreword to the *Arabicorum nominum interpretatio*, included in this volume, Alpago wrote:

> After I, Andrea Alpago of Belluno, physician, had emendated the books which Avicenna wrote on medicine . . . from the Arabic text, noticing that many excellent philosophers and physicians were greatly handicapped because of an unfamiliarity with the names of medicinal simples as well as of other Arabic terms, and that varying and erroneous expositions were made upon the aforesaid books, I decided . . . to explain in alphabetical order and to the best of my ability all the Arabic words found in these . . . volumes according to Ebenbitar, Ebenefis . . . and other Arabic authors . . .

That Alpago had, indeed, read other works by Ibn an-Nafis besides the *Expositio* and the work which provided the excerpts for the *Consideratio sexta de pulsibus* of Siraxi, is indicated in the *Arabicorum nominum interpretatio*. Under "gienum" Alpago interpreted this word to mean "agitation or furiousness in manner and gestures" and mentioned as a source for this interpretation an exposition of Ibn an-Nafis on the book

of Samarcandi. According to Alpago, this book contained a chapter "on madness" in which Ibn an-Nafis interprets the word *gienum* as agitation.

If Alpago had read Ibn an-Nafis' description of the lesser circulation, we might expect to find some reference to Ibn an-Nafis in the marginal notes to the *Canon* in those sections of it which deal with anatomy, particularly the places in which Avicenna discusses the heart and lungs. But a perusal of the anatomical sections in the 1527 edition reveals that in them Alpago makes no mention of Ibn an-Nafis.

From the foregoing remarks it is immediately evident that Andrea Alpago knew of Ibn an-Nafis, that he had read his exposition on the fifth canon of Avicenna, his exposition on the book of Samarcandi, and that he was familiar with certain of Ibn an-Nafis' ideas concerning the cardiovascular system. Beyond this we cannot go. If he had read Ibn an-Nafis' account of the pulmonary circulation, he makes no mention of it. Still, considering Alpago's long sojourn in the Middle East and his intense interest in Arabic medicine and Arabic medical writers who had commented on Avicenna, it would seem unreasonable to assume that he had not at least seen it. Whether or not it was translated into Latin is at present not known. If translated, Alpago's Latin version must have remained in manuscript form because I can find no record of its ever having been published.

It is possible that somewhere among the unpublished manuscripts of Andrea Alpago is to be found a rendering of Ibn an-Nafis' description of the lesser circulation. Certainly such manuscripts are extant. Andrea Alpago died intestate during the early 1500's and, accordingly, on February 11, 1522, an arbitrary legal decree was formulated dividing his estate among thirteen living heirs, all of them of the Alpago family.[65] Two hundred years later most of the manuscripts and other documents left by Andrea had been collected together and were preserved in the Alpago library in Belluno by Francesco Alpago (1742-86), a direct descendant of the famous physician. Furthermore in 1813 Ticozzi wrote that a certain Cesare Alpago had in his possession a letter written from Damascus, partly by Andrea and partly by Paolo, and dated April 21, 1502.[66] However, through intermarriage and the ravages of war, the collection was again to become dispersed. Evidence of this is to be had from a note by Luigi Alpago-Novello[67] that in 1844 the Pagani family of Belluno sold at Venice, for the unbelievably small sum of 600 lire, the entire "famous collection" of *cose patrie* inherited by Francesco Alpago. Whatever papers

[65] Alpago, *l.* 67verso. [66] Ticozzi, p. 68. [67] Alpago-Novello, Section 11.

remained in Belluno following this sale were carefully preserved by Luigi Alpago-Novello who in the earlier part of this century possessed a "certain number of documents" nearly all of which were, however, unfortunately destroyed during World War I.[68] After the war Luigi set about reconstructing the Alpago Library, and at the present writing it remains in the custody of his son, Alberto Alpago-Novello of Milan and Belluno.[69]

During the Austrian domination of 1813-66, some of the documents found their way into Austria. Luigi Alpago-Novello, writing in 1931,[70] mentioned that there was at that time in the Imperial Library of Vienna an autograph of Andrea Alpago entitled *Andrea Bellunensis glossarum nominum Arabicorum ex Avicenna, aliaque miscellanea Arabica.* Professor O'Malley has obtained a microfilm of this manuscript, but has informed me that ". . . it appears to be merely a part of the glossary printed in his Latin edition of Avicenna. Moreover, it does not appear to be in an early sixteenth century hand." [71]

A further clue to the possibility of there being other extant manuscripts is found in a printed book on Avicenna, also by Andrea Alpago, the *Compendium de anima,* Venetiis, apud Juntas, 1546. Immediately following the frontispiece of this book there is a dedicatory letter from Paolo Alpago to the cardinal Alessandro Farnese in which Paolo mentioned that since his youth (*adolescens*) he had been a constant companion of his uncle Andrea. He went on to say that Andrea, at his death, had left some other translations from the Arabic, both of Avicenna and from other authors, and that these translations were then (1546) in his possession. Paolo promised to publish them, a promise that was kept only in part. The titles of these works were *De venenis, De correctione errorum qui accidunt in regimine sanitatis, De medicinis principum non horribilibus, De lapidibus pretiosis,* and a "great many others." [72] It is possible that these and other manuscripts left by Andrea Alpago may yet come to light, and that among them we eventually may find a description of the pulmonary circulation by Ibn an-Nafis.

If Andrea and Paolo Alpago were aware of the concept of the pulmonary circulation from the Arabic manuscripts which they had collected, a possible route by which the idea could have reached Padua was through the person of the Paduan Niccolò Massa (1499-1569). Massa is known

[68] Private communication from Alberto Alpago-Novello to the author dated 3 July 1955.
[69] Dott. Arch. Alberto Alpago-Novello, Via F. Melzi d'Eril 6, Milan.
[70] Alpago-Novello, *op. cit.*, Section 11.
[71] Private communication from Charles D. O'Malley to the author dated 22 June 1955.
[72] ". . . pleraque alia."

chiefly for his book on syphilis, *De morbo gallico*, which appeared in 1532. It is unlikely that he had any contact with the elder Alpago because Andrea died in 1521, shortly after his return to Italy, but he did know Paolo. He had obtained from Paolo the manuscript of an Arabic life of Avicenna by Sorsanus, and after having it translated into Italian by Marcus Fadella, an interpreter for the Venetian merchants in Damascus, rendered the Italian version into Latin prior to its inclusion in the 1544 edition of the *Canon*.[73] Professor O'Malley has pointed out[74] that Massa, in his book on anatomy published in 1536, described the septum of the heart as a "dense and hard substance without any cavity." It is uncertain, however, whether by this Massa was referring to the third ventricle of the heart according to Aristotle, or the pores of the septum according to Galen. In any case Massa does not mention any septal pores, and it is reasonable to assume that there was some doubt in his own mind as to their existence.

There is another way in which the views of Ibn an-Nafis possibly might have become known to the Italian anatomists. Contarini, in his remonstrance against Alpago before the Venetian Senate in 1507,[75] referred to Paolo Alpago as a physician of "very little experience." However, Massa, in the foreword to his translation of the life of Avicenna by Sorsanus, in the *Canon* of 1544, described Paolo as "the eminently learned Paolo Alpago." From this reference it is not clear whether Massa was referring to Paolo's medical or linguistic talent, but other evidence indicates that it was the former. After he had brought out the first edition of the *Canon* in 1527, Paolo did not publish anything else until 1544, when he edited the second edition of the *Canon*. There soon followed a number of publications by him in the years 1544, 1546, and 1550. One wonders, then, what Paolo was doing during the interval between 1527 and 1544. According to Wüstenfeld, Paolo did not begin to study medicine until *after* 1527.[76] Further, Luigi Alpago-Novello wrote that Paolo Alpago, in 1521, was a public notary and that he was not admitted to the Consiglio dei Nobili until 1527. In 1540 he married, and died sometime prior to 1553.[77] It is unlikely that he would have embarked upon a marital career had he not yet completed his medical course and, indeed, a manuscript in the Alpago-Novello library gives under the date August 6, 1541,

[73] *Avicennae Liber Canonis*, Venetiis, apud Juntas, 1544.

[74] Private communication to the author.

[75] See Appendix.

[76] Wüstenfeld, *op. cit.*, p. 124. "Paulus studierte dann selbst Medicin . . ."

[77] Alpago-Novello, Marginal notes in: *Notizie e lettere di Andrea Alpago Medico in Damasco tratte dai Diarii di Marino Sanuto*. Copy in Alpago-Novello library, Frontin di Trichiana, Belluno.

the name and title of Paolo d'Alpago Dr.[78] Final evidence that Paolo was not yet a physician in 1527 is given in his own words. In the second (1544) edition of the *Canon* he explained that at first he had given charge of the 1527 revision to a man "as much a doctor as a scholar" because he himself (Paolo) had not yet devoted his energies to medicine, i. e., had not studied it formally.[79] But the result was so unacceptable that Paolo, nevertheless decided to supervise the edition himself because he at least had had some *experience* with medicine.[80] It is evident, then, that sometime between 1527 and 1541 Paolo pursued his medical studies. But where? In view of his long and close relationship with his uncle, and considering that Andrea had studied at Padua and was later appointed to a chair of medicine there, it is highly probable that Paolo matriculated at his uncle's *alma mater*. Unfortunately, the student register at the University of Padua does not extend back beyond the seventeenth century, so this cannot be verified. But we are certain that he lived for a time in Venice. On November 17, 1542, the commune of Belluno directed Paolo Alpago and Antonio Pagani to bear official congratulations to the newly appointed bishop of Belluno:

> A commission was given to Dr. Paolo Alpago and Antonio Pagani, who were then living at Venice, to congratulate our Most Reverend Bishop on his creation and elevation to the Bishopric.[81]

Not only was Paolo a resident of Venice, but he also must have spent a good deal of time in Padua by reason of the large interests which his uncle Andrea left in both these cities. The estate of Andrea Alpago in Venice and Padua amounted to the fabulous sum of 7,878 ducats.

There is good evidence, then, that Paolo studied medicine at Padua sometime between 1527 and 1541. The course in medicine required four years of study, and since Paolo probably had not received his baccalaureate before he left Italy, it is likely that he was at Padua for seven or more years, i. e., at least until 1534 and probably later. We know that three years later, in 1537, Vesalius came to Padua and that Realdo Colombo in 1540 was teaching sophistics there. While there is no evidence that Colombo and Paolo Alpago knew each other directly, the possibility may

[78] Doglioni, L. *Notulae in libros Provisionum Magnif.co Commun.tis Civit.is Belluni.* MS in: Alpago-Novello library, Frontin di Trichiana, Belluno. Book O, p. 62.

[79] ". . . quum ipse nondum medicinae animum applicaveram."

[80] ". . . cum iam medicinae non nullam operam navassem."

[81] "Fu data commissione al Dr. Paolo Alpago, ed Antonio Pagani, che si ritrovavano in Venezia, di congratularsi col R.mo Vescovo nostro della sua creazione ed elevazione a questo Vescovado." Doglioni, *op. cit.*, Book O, p. 33.

be suggested that Ibn an-Nafis' idea concerning the pulmonary transit, brought to Padua by Paolo Alpago, may have been circulating among the anatomists there at this time, and that Colombo, Vesalius' "amicus studiosissimus," intrigued by such a novel concept, began a series of researches that ultimately resulted in his verification of the passage of the blood through the lungs.

In this study an attempt has been made to link together Realdo Colombo and Ibn an-Nafis. It is evident that much more still remains to be learned, but it is the author's hope that the groundwork has been laid. Future research along these lines eventually may show that the theory of the pulmonary circulation propounded by Ibn an-Nafis in the thirteenth century was *not* forgotten, and that centuries after his death it may have influenced the direction of the anatomical investigations of Colombo and Valverde, who finally announced it to the Western world as a physiological fact susceptible to experimental proof.

Acknowledgment

I should like to thank Professor C. Donald O'Malley for contributing the major part of the Colombo translations, and Dr. John F. Fulton for allowing me to refer to his correspondence with Professor O'Malley.

APPENDIX

Andrea Alpago is sometimes called Andrea Bongajo or Mongajo.[82] According to Piloni [83] the Bongajo, a noble family, were governing the territory of Mestre near Venice in the fourteenth century. The family then moved to Belluno and in 1324 one Endrighetto de Bongajo was made Count of Alpago, a county or "pieve" of Belluno.[84] One of the progenitors of this titled family was Andrea Alpago who

[83] Our Andrea Alpago, *who died in 1521*, is often confused with another Andrea Alpago, a botanist, who was probably the son of Paolo. This confusion first arose when Mattioli wrote to Aldrovandi *in 1554*, "I have been greatly pleased that the trip into the mountains gave you the opportunity to know the ignorance of Aloigi Scortica Anquille and of the Belunese, who truly cannot be so villified that they do not merit worse." Elsewhere Mattioli wrote, ". . . it happened that when he went to Puglia to the mount of St. Angelo, among the others he brought with him that onionhead Alpago." [See Ticozzi, *op. cit.*] Thus Andrea Alpago, the onionhead botanist, is erroneously mentioned by Saccardo as having been a professor of medicine at Padua, and a translator of the works of Avicenna! (Saccardo, P. A. *La botanica in Italia*. Venezia, tipografia Carlo Ferrari, 1895.)

[83] Piloni, p. 137.

[84] Buzzati, Sec. 551.

was born about 1450 in Belluno,[85] the fifth of five sons of Nicolò Alpago whose great grandfather was Endrighetto.[86] He first pursued his studies in his native city, but then was sent to the University of Padua where he took the courses in philosophy and medicine. After receiving his medical degree there, he returned to Belluno, and being of noble birth was, on May 12, 1479, duly admitted to the Consiglio dei Nobili.[87]

"Since at that time the works of Arab physicians and philosophers were held in high esteem, Alpago soon learned that these works were defiled and spoiled in so many places that they did not present any reasonable sense."[88] Thus inbued with a desire to examine the original versions of the various emendated codices, Alpago accepted the offer of the Venetian consul in Damascus to come there and assume the duties of physician to the consulate, a post which then carried a large stipend and which gave ample opportunity for engaging in a lucrative commercial traffic. He took with him his nephew Paolo who at that time "did not understand anything about medicine."[89] The departure of the Alpagos from Belluno can be fixed at 1487 in the following way: in 1506 Andrea, having amassed a considerable fortune, considered having himself repatriated and accordingly obtained permission from the Council of Forty to return to Belluno. The Venetian consul in that year, Tommaso Contarini, having learned of Andrea's plans to leave Damasus, and wishing to procure a successor for him, selected another physician who came to join him in Damascus. However, after the newcomer's arrival, Andrea changed his mind about returning home and had himself reconfirmed as physician to the consulate by the Venetian Senate at a salary of 350 ducats a year. Contarini was much disturbed by this unexpected turnabout, and he therefore made remonstrance against Alpago to the Venetian Senate in 1507 accusing Andrea, who, he said, had been in Damascus for twenty years, of abusing his privileges of exemption from the "cottimo"[90] and of engaging in traffic harmful to the state. He complained further that Andrea was allowing the delicate incumbencies of his own office to be undertaken by his nephew, Paolo, a physician of "very little experience." The reputation which Andrea enjoyed among the principal magistrates of the Republic rendered the accusations of Contarini fruitless, and Andrea was retained at this post. He continued to practise at Damascus and to engage in the traffic of goods.[91] He had by now acquired an excellent knowledge of the Arabic tongue and occupied himself with collecting, translating, and editing the works of various Arabic medical writers; in this he was assisted by his nephew who was accustomed to helping at night in the correction of the Latin translations.[92]

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[85] Ticozzi, *op. cit.*, p. 67.
[86] Alpago, *op. cit.*, *l.* 48.
[87] Alpago, *op. cit.*, *l.* 37 verso.
[88] Ticozzi, *op. cit.*, p. 67.
[89] Wüstenfeld, p. 123.
[90] A tax on goods.
[91] It is interesting, in this connection, that Niccolò Massa, in his eulogy of Alpago in the 1544 edition of the *Canon* states that Andrea "despised riches." Alpago's interest in commercial trade is shown more clearly by a number of letters which he wrote to the Venetian Senate containing minute details of the movements and activities of the chief European trading fleets entering and leaving Damascus together with detailed descriptions of their cargoes. [Pellegrini].
[92] Wüstenfeld, *op. cit.*, p. 123.

In 1517 Andrea transferred his residence to Nicosia in Cyprus, as physician to the consulate there, receiving the same large stipend he had enjoyed at Damascus for thirty years. He remained there until 1520; he then returned to his homeland accompanied by Paolo and bringing with him the Arabic manuscripts he had collected during his absence of thirty-three years. He reached Belluno with Paolo on December 12, 1520, whereupon the two travellers were "honored and feted beyond belief."[93] He had hoped to enjoy a comfortable and happy old age, and was soon after elected to a chair of clinical medicine at Padua, undoubtedly in 1521.[94] But, after having dined happily with his family and friends one evening, he was suddenly taken ill and, lying down in bed, quietly expired. Many poems were written in his honor, and in 1566 his bust was erected over the front of his house in the street of S. Lucano.

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[93] Ticozzi, *op. cit.*, p. 70.

[94] Papadopoli places Andrea Alpago under the year 1506 as a teacher in Padua. That this is not so is evident from the fact that in that year Alpago was still in Damascus.

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NOTES AND COMMENTS

AN INTRODUCTION TO LITERATURE ON THE HISTORY OF GERONTOLOGY

GERALD GRUMAN

Interest in gerontology, the study of aging, has grown rapidly during the twentieth century. Progress in medicine and public health has increased the proportion of aged persons in the population. These persons require a vast program of support which has focused attention on the problem of senescence. Meanwhile, remarkable advances in such fields as cytology and biochemistry have revived the idea of prolongevity,[1] the hope that science may be able to extend greatly, perhaps indefinitely, the length of life.[2, 3, 4, 5]

Within the past decade gerontology has become a recognized and well-organized specialty in the United States. The American Gerontological Society was organized in 1945. The *Journal of Gerontology* began publication in 1946. In 1951, the federal government established a Committee on Aging which is now part of the Department of Health, Education, and Welfare. There are two Institutes of Gerontology in the United States, one at the University of Kansas and the other at the State University of Iowa.

Although it only recently has become an independent specialty, gerontology has deep roots in the past. Unfortunately, not enough systematic work has been done in tracing and evaluating these ties with the past. There is a great need for professional research in the history of gerontology. Such historical research would provide useful orientation on problems of aging; it also would throw light upon many now-hidden facets of the history of medicine.

[1] Gruman, G., C. A. Stephens (1844-1931)—Popular Author and Prophet of Gerontology. *New England J. of Med.* 1956, vol. 254, pp. 658-660. *Idem, Death and Progress: The Idea of Prolongevity in American Thought* (in progress).

[2] Stephens, C. A., *Natural Salvation.* Norway Lake, Maine: The Laboratory, 1903.

[3] Malisoff, W. M., *The Span of Life.* Philadelphia: Lippincott, 1937, pp. 188 and 265 ff.

[4] Shryock, R. H., *The Development of Modern Medicine.* N. Y.: Alfred Knopf, 1947, pp. 78 and 455-457.

[5] Thomson, George, *The Foreseeable Future.* Cambridge: Cambridge University Press, 1955, pp. 132-134.

Research in the history of gerontology is handicapped by the lack of a comprehensive full-length text on the subject.[6] The material is uneven in quality, and it is dispersed in numerous journals and books some of which are quite difficult to obtain. A number of essential sources have not yet been translated into English, French, or German.

A few years ago, N. W. Shock, Chief of the Section on Gerontology of the United States Public Health Service, prepared an extensive bibliography of gerontology and geriatrics. The work [7] was published in 1951 under a grant from the Forest Park Foundation which is devoted to the improvement of care for the aged. Since April 1950, Dr. Shock has continued his compilation in the bibliographical supplement accompanying each issue of the quarterly publication *Journal of Gerontology*. The classification system is designed in such a way that the bibliography can be kept up to date with the latest literature, while, at the same time, older works can be added as they come to the attention of the editor.

The Shock bibliographies are an invaluable contribution to the history of gerontology. However, it must be noted that in the 1951 publication not all the available material is to be found under the heading "History of Gerontology and Geriatrics." [8] For example, Zeman's important series of articles is listed under "Cultural Anthropology." [9] In the bibliographical supplements to the *Journal of Gerontology,* the history category, unfortunately, has been dropped entirely, and historical works are scattered through the "General Orientation" and "Miscellaneous" sections.

In my opinion, the three best historical works on gerontology as a whole are those of Freeman, Steudel, and Zeman. I will discuss these in turn. J. T. Freeman's article "The History of Geriatrics" [10] appeared in 1938. Freeman, a specialist in internal medicine in Philadelphia, helped to establish one of the first geriatrics clinics in the United States and has been a leader in the Geriatrics and Gerontological Societies. His 1938 article apparently was the first significant work on the subject. The word "geriatrics" in 1938 had not yet been restricted to its present

[6] There are, however, a number of book-length studies of special aspects of the history of gerontology, e. g., Simmons, L. W., *The Role of the Aged in Primitive Society*. New Haven: Yale Univ. Press, 1945, and Richardson, B. E., *Old Age Among the Ancient Greeks*. Baltimore: Johns Hopkins Press, 1933.

[7] Shock, N. W., *A Classified Bibliography of Gerontology and Geriatrics*. Stanford, Calif.: Stanford Univ. Press, 1951.

[8] *Ibid.*, p. 473.

[9] *Ibid.*, p. 449.

[10] Freeman, J. T., The History of Geriatrics. *Annals of Medical History*, 1938, vol. 10 (N. S.), pp. 324-335.

meaning, the medical treatment of the aged. Freeman's article is really as much a history of gerontology as of geriatrics. As must be expected of a pioneer effort, Freeman's article has several shortcomings. He relied entirely on sources available in English, and his treatment of ancient and medieval gerontology is inadequate.

Freeman's most important contribution, I believe, was his emphasis upon the history of gerontology as a rich and valuable field of research.[11] He tried to make his article more than a dry compendium of names and dates, and he succeeded in forming many of the data into a meaningful pattern. He felt that Roger Bacon was significant as a forerunner of the modern attitude towards old age, Cornaro for his rejection of alchemy and astrology, Floyer as the founder of modern geriatrics, Hufeland as the stimulator of public opinion, Canstatt for his professionalization of geriatrics, and Charcot as the symbol of the final shift of gerontology from the domain of philosophy to that of science. He singled out Rush, Franklin, and Caldwell as the originators of gerontology in America.

Steudel's article "Zur Geschichte der Lehre von den Greisenkrankheiten"[12] appeared in 1942. Johannes Steudel is Director of the Bonn Institute of Medical History and Associate Editor of *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften.* His paper naturally is a thoroughly professional work of medical history.

There are, however, certain limitations which somewhat restrict the value of Steudel's article. It is disappointingly brief, and the author had to concentrate his attention on certain points in which he was most interested and ignore the rest. Thus, there is no discussion of pre-Greek gerontology nor any mention of Chinese or Indian theories of senescence, and the section on modern gerontology breaks off in the 1860's. As the title indicates, the author tended to be concerned primarily with the clinical side of gerontology. This probably is why he did not mention Aristotle, and why his analyses of the Hippocratic school and of Galen and Avicenna consist of detailed listings of their clinical observations and therapeutic recommendations rather than a penetrating inquiry into their theoretical formulations. Another bias in Steudel's paper is his emphasis on German contributions to gerontology. Nicholas of Cusa, J. B. Fischer, B. W. Seiler, and Carl Canstatt are the heroes of the piece.

Steudel's nationalism, while exaggerating the role of German scientists, on the other hand, stimulated the most interesting and original parts

[11] *Ibid.*, p. 324.

[12] Steudel, J., Zur Geschichte der Lehre von den Greisenkrankheiten. *Sudhoffs Archiv für Geschichte der Medizin und der Naturwissenschaften,* 1942, vol. 35 (N. S.), pp. 1-27.

of his article. He described the attempts of Nicholas of Cusa to establish an exact quantitative basis for gerontology by weighing the urine and the blood and by measuring pulse and respiratory rates.[13] He pointed out that Floyer, traditionally the founder of modern geriatrics, was essentially a Galenist,[14] whereas J. B. Fischer, a German physician serving as chief of the Russian medical service, published in 1754 a book reorganizing gerontology on the basis of Vesalian anatomy and Harveian physiology.[15] He discussed the relationship between Canstatt and nineteenth-century *Naturphilosophie*.[16]

Although German influences predominated in Steudel's article, he kept patriotic considerations within reasonable bounds. For example, he gave full recognition to the French lead in establishing special hospitals for the aged and exploiting the resulting abundance of clinical and post-mortem material.[17] He also mentioned American priority in organizing geriatrics as an independent medical specialty.[18]

Zeman's series of articles " Life's Later Years; Studies in the Medical History of Old Age " [19] appeared between 1942 and 1950. F. D. Zeman is a private medical practitioner in New York City. Since 1925 he has been chief of the medical staff of the Home for Aged and Infirm Hebrews, and he has written many papers on geriatrics and gerontology.

Dr. Zeman's work is on a comprehensive scale. He progressed in a methodical manner, article by article, from primitive societies to ancient Egypt, Israel, Greece, Rome, Islam, Medieval Europe, the Renaissance, the seventeenth century, the eighteenth century, and the nineteenth century. Upon completion, the series was to have been published as a monograph. Unfortunately, no new articles have appeared since the one in 1950 which carried the subject to the end of the nineteenth century.

Some of the early articles in Zeman's series rely rather heavily on secondary sources. However, as the author continued his work, he consulted more and more the primary sources and the foreign-language material. Many of the articles are excellent, and all are interesting and

[13] *Ibid.*, pp. 13-14.
[14] *Ibid.*, p. 12.
[15] *Ibid.*, pp. 15-17.
[16] *Ibid.*, pp. 20-22.
[17] *Ibid.*, pp. 22-24.
[18] *Ibid.*, p. 18.
[19] Zeman, F. D., Life's Later Years; Studies in the Medical History of Old Age. *J. Mt. Sinai Hospital* (N. Y.) 1942, vol. 8, pp. 1161-1165; 1944-45, vol. 11, pp. 45-52, 97-104, 224-231, 300-307, 339-344; 1945, vol. 12, pp. 783-791, 833-846, 890-901, 939-953; 1947, vol. 13, pp. 241-256; 1950, vol. 16, pp. 308-322; 1950, vol. 17, pp. 53-68.

beautifully illustrated. It is regrettable that Zeman's work has not yet been published in book form as an introductory history of gerontology.

The other historical papers on gerontology as a whole can be reviewed briefly. Kotsovsky [20] dismissed ancient, medieval and early modern gerontology in a few sentences and, thus having reached 1850, presented a lengthy list of investigators since that time together with laconic accounts of their gerontological theories. The article concludes with Kotsovsky's own theory and an extensive bibliography valuable for an historian of modern gerontology. The book by G. Stanley Hall,[21] the famous American psychologist, includes some interesting historical material. Hall's work was used by Freeman and Zeman and apparently helped to stimulate their research. S. R. Burstein's article in the *Post Graduate Medical Journal* [22] is helpful for its data on the gerontology movement in Great Britain. Her series in *Geriatrics* [23] is excellently illustrated but the text is rather brief and discontinuous. Price's misnamed article [24] is not really historical. Thewlis [25] and Nascher,[26] the latter of whom coined the term "geriatrics," each wrote brief historical essays useful as source material on the geriatrics movement in the United States just before and during World War I. Kafemann's misnamed article [27] is primarily a discussion of contemporaneous research on longevity.

In summary, it is desirable that medical historians give more attention to the history of gerontology. As yet no comprehensive book has been published on the subject and many important source materials have not been translated. However, the valuable studies by Freeman, Steudel, and Zeman can serve as an introduction to the field. The bibliographies of these authors and, above all, the splendid bibliographies compiled by Shock point the way to a mass of fascinating source material and list a

[20] Kotsovsky, D., Das Alter in der Geschichte der Wissenschaft. *Isis*, 1933, vol. 20 (N. S.), pp. 220-241.

[21] Hall, G. S., *Senescence: The Last Half of Life*. N. Y.: Appleton, 1922.

[22] Burstein, S. R., Gerontology: A Modern Science With a Long History. *Post Graduate Medical J.* (London), 1946, vol. 22, pp. 185-190.

[23] Burstein, S. R., The Historical Background of Gerontology. *Geriatrics*, 1955, vol. 10, pp. 189-193, 328-332, 536-540.

[24] Price, M. L., Ancient and Modern Theories of Age. *Maryland Medical J.* 1906, vol. 49, pp. 43-51.

[25] Thewlis, M. W., The History of Geriatrics. *Medical Review of Reviews* (N. Y.), 1918, vol. 24, pp. 285-288.

[26] Nascher, I. L., A History of Geriatrics. *Medical Review of Reviews* (N. Y.), 1926, vol. 32, pp. 281-284.

[27] Kafemann, R., Das Problem des langen Lebens von Gorgias bis Alexis Carrel. *Altersprobleme*, 1937, vol. 1, pp. 33-44.

large number of historical studies on special aspects of gerontology.[28] Using these pioneer works the medical historian should be able quite readily to orient himself in the history of gerontology.[29]

[28] Some examples of studies of special aspects of the history of gerontology are: Burstein, S. R., Care of the Aged in England. From Mediaeval Times to the End of the Sixteenth Century. *Bull. Hist. Med.*, 1948, vol. *22*, pp. 738-746; Belt, E., Leonardo da Vinci's Studies of Aging Process. *Geriatrics*, 1952, vol. 7, pp. 205-210; and Angel, J. L., Length of Life in Ancient Greece. *J. Geront.*, 1947, vol. 2, pp. 18-24. There are many others.

[29] For a competent and provocative account of the present situation in gerontological research see Comfort, Alex., *The Biology of Senescence*. N. Y.: Rinehart, 1956.

A PASSAGE IN VESALIUS' *EPITOME* ON THE "KINGS OF EGYPT"

JOSHUA O. LEIBOWITZ

The prefaces and prefatory letters of Vesalius contain very valuable information on his general ideas, his scientific program, his inclinations and antipathies, and his notion of humanism. Vesalian students, however, may at times be confronted with an obscure passage, and the preface of the Latin *Epitome*,[1] directed to Prince Philip, son of the Emperor Charles V, contains such a passage which requires some explanation.

The preface is addressed to the son and heir of the Emperor whose benevolent attitude to the newer practice of dissection it tries to arouse. After sharp criticism of those who are ignorant in anatomy, of "those pestilent doctors who encompass the destruction of the common life of mankind, who never even stood by at a dissection,"[2] Vesalius proceeds: "Whereas in the knowledge of the body no one could produce anything of value who did not perform dissections with his own hands as the kings of Egypt were wont to do. . . ."[3]

Who might be those mysterious kings of Egypt to whom Vesalius refers in this passage, and what are the classical sources of his information?

I.

The first possible source is a passage in Celsus' *De medicina*,[4] a book not commonly referred to in medieval medicine but much used in the Renaissance, for instance by Benivieni.[5] Vesalius studied Celsus and referred to him occasionally, not always in approval of his views.[6] Celsus' passage in the English translation of Spencer reads as follows: "They hold that

[1] Vesalius, Andreas, *The Epitome of Andreas Vesalius*, translated by L. R. Lind, New York, 1949.

[2] *Ibid.*, p. xxiv.

[3] *Ibid.*, p. xxxv. The Latin text reads: ". . . quum in corporis cognitione nemo aliquod operae precium praestiturus sit, qui non propriis manibus, uti Aegyptiorum reges consueverunt, sectiones obierit . . ."

[4] Celsus, Aulus Cornelius, *De medicina*, with an English translation by W. G. Spencer, vol. 1, London and Cambridge, Mass., 1935, The Loeb Classical Library, prooemium 27, p. 15. The Latin text reads: ". . . longeque optime fecisse Herophilum et Erasistratum, qui nocentes homines a regibus ex carcere acceptos vivos inciderint . . ."

[5] Roth, M., *Andreas Vesalius Bruxellensis*, Berlin, 1892, p. 193.

[6] Vesalius, *De humani corporis fabrica libri septem*, 1543, I, 15, p. 67; I, 10, p. 44.

Herophilus and Erasistratus did this [i. e. anatomizing] in the best way by far, when they laid open men while alive—criminals *received* out of prison ***from the kings*** . . ."

Celsus' reliability as to the fact of human vivisection aside, it appears that Vesalius, in speaking of the "Aegyptiorum reges," meant the Ptolomies and the School of Alexandria, to which he referred expressly in the preface of the *Fabrica*.[7]

To this suggestion that while writing down the preface Vesalius had in mind Celsus, two points may be added. First, Celsus' testimony is contained in the prooemium, and Vesalius as a humanist followed the ancient example of composing his own preface. Secondly, even the order of details to be observed at the dissection corresponds closely to Celsus' enumeration. Vesalius speaks of each part to be examined as to its "location, form, size, color, the nature of its substance, and the principle of its connection with other parts" almost in the same way as Celsus who mentions: "position, color, shape, size, arrangement, hardness, smoothness, relation . . . and whether any part is inserted into or is received into another."

Thus the pattern of Vesalius' preface is found and the kings of Egypt located. The phrase "perform dissections with his own hands as the kings of Egypt were wont to do" need not literally mean kings themselves performing dissections. It may mean, in a Renaissance manner, that the dissections were authorized and the criminals received from the hands (Hand = power, as in Biblical poetry) of the kings.

II.

Another possible source of Vesalius' information on the "kings of Egypt" is Pliny. Vesalius does not refer to this Roman author in his works. However, Pliny's Natural History belonged to the classical works regularly taught by Sylvius, Vesalius' teacher at the University of Paris.[8] Besides, Pliny was among the first classical authors whom Renaissance scholars scrutinized as to his errors, much as Vesalius did concerning Galen.[9]

[7] "There is ground for hope that anatomy will ere long be cultivated in all our academies as it was of old in Alexandria"; The preface of Andreas Vesalius to De humani corporis fabrica, 1543, translated by B. Farrington, *Proceedings of the Royal Society of Medicine*, Section of the History of Medicine, vol. 25, July 1932, pp. 1357-1366.

[8] See Roth, *op. cit.*, p. 196 f.

[9] Nicolaus Leonicenus in his *De Plinii et plurium aliorum medicorum in medicina erroribus*, Ferrara, 1492, refers to the use of radish (raphanus) without, however, mentioning the passage quoted below from Pliny (fol. 25 recto, of the Ferrara 1509 edition).

The passage in question is contained in Book 19, 86, where Pliny[10] explains the medical use of radishes: "They [i. e. medical men] also say that radish juice is an essential specific for disease of the diaphragm, inasmuch as in Egypt, when the kings ordered post mortem dissections to be made for the purpose of research into the nature of diseases, it was discovered that this was the only dose that was capable of removing phtheiriasis attacking the internal parts of the heart."[11]

The old translation by Philemon Holland,[12] apart from a very different version of the pathology, renders the reference to the kings of Egypt in a rather similar way, and so does the translation in Bohn's Classical Library.[13]

It seems that this passage of Pliny's[14] might very well be a source of Vesalius' information about the kings of Egypt, even a more direct one than that found in Celsus. Pliny does not discuss vivisection, to which Vesalius does not refer in the preface either. Furthermore, though all translators let the kings "order" dissections, the Latin original also allows the meaning that the kings themselves dissected the bodies (regibus insecantibus).

Both sources may explain the rather curious passage in Vesalius' preface, that to learn anatomy one must "perform dissections with his own hands as the kings of Egypt were wont to do."[15]

[10] Pliny, *Natural History*, with an English translation by H. Rackham, vol. V, London and Cambridge, Mass., 1950, The Loeb Classical Library, p. 476: "tradunt et praecordiis necessarium hunc sucum, quando φθειρίασιν cordi intus inhaerentem non alio potuisse depelli conpertum sit in Aegypto regibus corpora mortuorum ad scrutandos morbos insectantibus."

[11] *Ibid.*, p. 477.

[12] Plinius, C. secundus, *The Historie of the World, Commonly called The Natural Historie*. Translated into English by Philemon Holland, London, 1601, Tome 2, p. 17 D.

[13] Pliny, *The Natural History*, Translated by J. Bostock and H. T. Riley, vol. IV, Bohn's Classical Library, London, 1890, p. 165.

[14] Sprengel, K., *Versuch einer pragmatischen Geschichte der Arzneykunde*, vol. 1, dritte Auflage, Halle, 1821, p. 100, refers to it.

[15] The present writer is much obliged to Dr. O. Temkin for his help in ascertaining the sources in Celsus and Pliny.

MEDICO-HISTORICAL NEWS AND ACTIVITIES

CORRESPONDENCE AND REPORTS

REPORT OF THE FIFTEENTH CONGRESS OF THE INTERNATIONAL SOCIETY OF THE HISTORY OF MEDICINE

The Fifteenth Congress of the International Society of the History of Medicine took place in Madrid from September 21 to 29, 1956, and was a most enjoyable and successful event. Under the forceful and dynamic leadership of Prof. Dr. Pedro Lain Entralgo, president of the local committee, the meeting was certainly one of the most successful ones in the history of the International Society. The congress began on the twenty-second in the Instituto de Cultura Hispánica, and various delegates assembled in the main auditorium, where the presiding officer was the well-known and highly respected Prof. E. Wickersheimer, dean of French medical historians. This was a very interesting and intriguing session, in which every delegate addressed the audience in his native tongue. The only speaker having an interpreter was the delegate from the Soviet Union, whose remarks were translated into French, English, and Spanish. The delegates represented Austria, Belgium, Brazil, Denmark, France, Germany, Great Britain, Greece, Israel, Italy, Netherlands, Portugal, Rumania, Russia, Spain, Sweden, Switzerland, Turkey, United States, Yugoslavia.

After the preliminary gathering, there was an inspection of documents of historical interest in the Institute, followed by an informal tea and reception. The following day, the congressists were taken on an excursion to Toledo, where, in spite of a drenching rain, everyone had an enjoyable visit to this interesting and ancient city. Many busses were also filled with representatives to the International Congress of Internal Medicine, which met in Madrid at the same time. A gala bull fight was arranged in the afternoon, and this was carried out in spite of the frequent down pours of rain.

The scientific séances began the following day and lasted until noon, when the group adjourned for a visit to the famed Prado Gallery of Art. The program noted that the official language was Spanish and French, but many papers were read in English or German. The planned excursion to Salamanca for the final sessions and banquet was cancelled, and these were held in the environs of Madrid itself. Then the members took excursions to Cordoba, Sevilla, and Granada, in which this delegate did not take part because he had previously spent some two weeks in this part of Spain before proceeding to Madrid.

Among the active and prominent members of the International Society of the History of Medicine who were present were Prof. Ivolino de Vasconcellos, of Brazil, the dynamic, forceful, and charming advocate of medical history in the southern hemisphere; the reserved, scholarly Wickersheimer, from Schiltigheim, who is certainly one of the most highly respected men in the history of medicine;

Dr. W. Artelt of Frankfort, who is director of a most active and productive institute of the history of medicine in Germany; Prof. M. D. Grmek from Yugoslavia, who is a faithful attendant at all the congresses and who invariably reads a stimulating and interesting paper; Prof. Adalberto Pazzini, the director of the Institute of the History of Medicine at the University in Rome; Prof. Giuseppe Pezzi, of Rome; Dr. Ladislao Münster, of Bologna; Dr. A. Finot, of Paris; Dr. Francisco Oliver, of Zaragoza; Prof. Martin Müller, for years director of the Institute of the History of Medicine in Munich; Prof. F. A. Sondervorst, of Louvain, the Society's secretary; Prof. J. O. Leibowitz, of Jerusalem; Dr. Edgar Goldschmid, from Lausanne, a man of charm and erudition; Dr. E. A. Underwood, of the Wellcome Historical Medical Museum, London, who delivered a beautiful and eloquent tribute to the late Max Neuburger. The American contingent consisted of Genevieve Miller, of Cleveland, who read a paper on "Daniel Le Clerc's Histoire de la Médecine"; Charles D. O'Malley, of Stanford, who spoke on "Remarks on the Iconography of the Frontispiece to the Fabrica"; G. K. Tallmadge, of Milwaukee, who read a paper on "Neuvas cuestiones sobre la Iconografía en el 'De Disectione Partium' de Carlos Estienne"; David A. Tucker, Jr., of Cincinnati; John F. Fulton, of New Haven, whose "conferencia extraordinaria," a paper on the history of conditional reflexes, was written with his characteristic clarity and scholarship and delivered with the usual charm and interest; and Ralph H. Major, the official delegate from the American Association of the History of Medicine, whose paper, "American Indian Medicine in North America," was read by title. The majority of the papers were quite naturally read in the Spanish language, which a great many of the congressists did not understand, but that, of course, was the fault of the listener and not of the speaker. The program was divided into four sections or Temas, as described in the official program: The Iberian Peninsula and Arabic Medicine; Medical Relations between the Iberian World and the Other Countries of Europe; Medical Iconography of the Sixteenth Century; and various themes. One hundred forty-seven papers were scheduled for five days, an average of nearly thirty papers a day, which made the meeting a rather strenuous one for those faithful souls who never miss a paper.

Everyone voted the meeting a most happy and profitable experience. The great gain many of us have is not so much in attending the meeting and hearing the papers on the official program but in having a chance to see old friends, exchange views, and hear how the history of medicine is progressing in the various parts of the world. This reporter has the same reaction as he had from attending previous congresses. Although a good many have contributed time and effort to keep the organization alive and of interest to its members, its success and continued vitality is due particularly to the devoted efforts of Dr. Sondervorst of Louvain.

RALPH H. MAJOR

Delegate, American Association of the History of Medicine

ANNOUNCEMENTS

AMERICAN ASSOCIATION OF THE HISTORY OF MEDICINE

The Thirtieth Annual Meeting of the American Association of the History of Medicine will be held in Richmond and Williamsburg, Virginia, on May 6-8, 1957. The headquarters will be at the Hotel John Marshall. Members planning to attend are urged to make their reservations as early as possible.

NATIONAL NEWS

Biographical Information Wanted

In a letter to the Editor, James H. Cassedy, 281 Benefit St., Providence 3, R. I., writes: "I am writing a biography of Dr. Charles V. Chapin (1856-1941), the eminent Providence pioneer in the American Public Health movement. Since many of his own files were destroyed by flood, I would very much appreciate hearing from any of your readers who have personal recollections of Dr. Chapin or who know the location of any of his correspondence."

Chicago

The annual D. J. Davis Memorial Lecture on Medical History will be given on Wednesday, May 15, at 1 p. m., at the University of Illinois College of Medicine. The lecturer will be Dr. Elmer Belt of Los Angeles who will speak on Leonardo da Vinci's Medical Observations.

Death of Dr. Hume

On February 9, 1957, Dr. Edward H. Hume died in the Gaylord Farm Sanitarium at Wallingford, Conn., at the age of 80. Well-known to medical historians for his Noguchi Lectures on *The Chinese Way in Medicine* (Baltimore, 1940), Dr. Hume held the position of Lecturer in the History of Medicine at the Johns Hopkins University School of Medicine from which he had graduated in 1901. He was for many years a member of the American Association of the History of Medicine. The *Bulletin* plans to publish an obituary of Dr. Hume in a later issue.

Kansas

According to the Kansas University School of Medicine and Medical Center *Bulletin* (vol. 8, no. 3), plans are under way for dedication ceremonies of the new library building on May 17. The history of medicine collection will be housed on two levels of the smaller wing. A reproduction of the history of medicine library, planned for his collection by the late Dr. Logan Clendening, and now located in

the Hixon Laboratory, will be built on the main floor of the new building. A replica of the present medical museum will be on the second floor.

National Library of Medicine

Among the "appointed members" of the Board of Regents of the National Library of Medicine, appointed by President Eisenhower, are the following members of the American Association of the History of Medicine: Dr. Jean A. Curran, and Dr. Benjamin Spector who is currently President of the Association.

PROGRAMS OF MEETINGS

Beaumont Medical Club

November 9, 1956: "Reminiscences of Some Yale Men in Medicine," Deane Keller.

January 18, 1957: "Found—the 1767 Medical Corporation in Litchfield," Byron Stookey.

Benjamin Waterhouse Medical History Society

March 18: "A Hidden Manuscript on Hand Surgery by Horace Packard," John J. Byrne.

Johns Hopkins Medical History Club

February 18: "Maimonides on Medical Practice," Joshua O. Leibowitz; "Localization of Psychological Functions in the Brain Ventricles," H. W. Magoun.

Society of Medical History of Chicago

March 7: "Benjamin Rush, Reformer, Psychiatrist, Physician," Ilza Veith; "Illustration Mobile," Herman H. Henkle.

NEWS FROM ABROAD

Japanese Society of Medical History *

This academic society was organized in 1915 for the promotion of study, teaching, and propagation of the history of medicine with Dr. Y. Fujikawa, who devoted his life to the study of medical history of Japan and compiled an authoritative text on the subject. The society developed gradually and in 1934 it was recognized as a section of the Japanese Association of Medical Sciences. At present it has some 450 regular members. The board of directors is composed of Professors K. Uchiyama (chairman), M. Ishikawa, T. Ogata, T. Ogawa, S. Sugi, and others. The

* Communication from Professor Mitsuteru Ishikawa, The Tokyo Jikei-kai School of Medicine, to Dr. Shryock, January 30, 1957.

headquarters is in Tokyo, with a branch in Osaka. Monthly meetings are held in both of these cities, and the national congress is held annually in the spring. *Nihon Ishigaku Zasshi* (The Journal of the Japanese Society of Medical History) is published quarterly.

There are 47 medical schools in Japan, and lectures on the history of medicine are given in 17 of them, but no independent institute or department has been established in any of the medical schools.

HENRY E. SIGERIST

April 7, 1891—March 17, 1957

As this issue goes to press, news has been received of the death of Dr. Sigerist who founded this Bulletin in 1933 and guided it for fifteen years.

BOOK REVIEWS

KARL ERNST VON BAER. *On the Genesis of the Ovum of Mammals and of Man.* Translated into English by Charles Donald O'Malley. With an Introduction by I. Bernard Cohen. Cambridge, Mass.: History of Science Society, Inc., 1956. [Publication from *Isis*, 1956, pp. 117-153.] Ill. $1.00.

Von Baer's letter on the genesis of the ovum is one of those masterworks of science that are honored by all but read by almost nobody. This is a pity, because no book illustrates more forcibly some of the basic difficulties of research—that even a great investigator does a good deal of naive groping; that even such a man can be hampered by the preconceptions of his time; that even a discovery like von Baer's may have to await advances in other fields before it can be fully understood. The reason why this book goes unread and why it has waited 129 years for publication in English is obvious. Von Baer made a very brilliant observation when he clearly saw that the mammalian egg is not something that condenses out of nothing, in the uterus, as Harvey and Haller thought; nor is it the whole ovarian follicle as DeGraaf believed, but is in fact a tiny solid round object, just on the verge of vision with the unaided eye, within the follicle. But von Baer could not discover how the egg is related to the bodily structure in which it develops, nor how it gives rise to the embryo which it precedes. Without benefit of the cell theory of animal structure, without a microtome to furnish intelligible sections of the ovary, von Baer's discovery was but a ray of light surrounded by obscurity. His book of six chapters is therefore built around two paragraphs of thrilling interest in which he tells how he opened a follicle in the dog's ovary and placing the contents under his microscope " saw an ovule so clearly that even a blind man could scarcely deny it. It is truly remarkable and surprising to be able to demonstrate by so simple a procedure a thing which has been sought so persistently and declared in every handbook of physiology to be inexplicable." These paragraphs are surrounded by accounts of von Baer's search for early embryos, by attempts to analyze the structure of the Graafian follicle, and by conjectural, somewhat formalistic efforts to compare the egg of mammals with those of lower animals and to explain how it grows into an embryo. These passages contain many observations of historical interest to the specialist in embryology and ovarian histology, but they are almost meaningless nowadays to the general reader. Von Baer's achievement can now be appreciated only by means of a vernacular version and by an informed commentary such as is given us by Professor A. W. Meyer's book on Burdach, Döllinger and von Baer which is also reviewed in this number of the *Bulletin*.[1]

Von Baer's book was translated into French about a year after it appeared in Latin, by G. Breschet in *Répertoire Général d'Anatomie et de Physiologie Pathologiques*, Paris, 1829. T. VII, pp. 155-218. In 1927 the firm of Leopold Voss in Leipzig, which published the original edition, brought out as a centennial tribute

[1] See below, p. 93.

a German version by B. Ottow. Now Dr. Charles Donald O'Malley has produced the long-needed English translation, bringing to the task his well-known combination of excellent Latinity with understanding of anatomical thought.

In recommending Professor O'Malley's translation the reviewer claims the qualification of having himself attempted exactly the same task. On his desk in fact are two manuscript English translations of *De Ovi Mammalium*, one his own made thirty years ago (unpublished through sheer lack of enterprise), the other a crude version made still earlier by a divinity student for Dr. J. P. Pratt of Detroit. Comparison of O'Malley's translation with these two shows the practiced hand of the historical scholar. He has skillfully overcome the major difficulty faced by translators of historical texts, which is to make the author's meaning clear to a modern reader without making it overexact through the use of terms that now have a more precise, or even different meaning. He has preserved the book's odd mixture of the formality of an academic epistle with the enthusiasm and puzzlement of a scientific worker breaking into a new field.

In only a few places does the translator reveal that he is not an embryologist. The word *arcus* (pp. 125, 126) could quite properly have been rendered not as "arc" but by "arch," the word in current use for the vessels in question. The words *spina dorsalis* (of fishes) p. 127, might well be translated "spinal column" instead of "dorsal spine" to avoid transient confusion with the spines of the dorsal fin. On p. 140 the unfamiliar word "bulla" describing the ovarian capsule (Latin *bulla*, meaning "bubble") could safely be replaced by "pouch" or "sac." An odd slip occurs on page 133, where Graafian follicles are said to occur in the stag, surely the least feminine of animals. The Latin word is *erinaceus* (hedgehog); it is correctly translated later in the same paragraph. The stag wanders in again on page 140, where the original text has *in feris*, literally "wild animals." This passage has been a puzzle to previous translators. The best guess is that a word was omitted here, von Baer probably having originally written *in felibus feris*, referring to the European wild cat, *Felis sylvatica*, a species to which the statement that follows could correctly apply. Other specialists may perhaps find a few similar conundrums for pedantic comment, but these are trifles. Professor O'Malley deserves cordial thanks for giving us von Baer's monograph in an English version that faithfully represents the author's achievements and perplexities.

GEORGE W. CORNER

ARTHUR W. MEYER. *Human Generation. Conclusions of Burdach, Döllinger and von Baer.* Stanford: Stanford University Press, 1956. xi + 143 pp.

Shortly after Karl Ernst von Baer wrote his famous *Epistola de Ovi Mammalium et Hominis Genesi*, in which he announced the discovery of the mammalian egg, he prepared a commentary upon it in German, intended to explain his findings more fully. This "Commentar" is less conjectural and better focussed upon its subject than is the *Epistola*. It has, however, been neglected and indeed almost forgotten. Now it is brought to light again in an English translation by an experienced student of the history of embryology, the indefatigable octogenarian Arthur

W. Meyer, Professor Emeritus of Anatomy at Stanford University. Dr. Meyer has added notes on von Baer's life, temperament, and works, and for good measure has thrown in translations of three brief articles on human development by von Baer's teachers, two in Latin by Karl Friedrich Burdach and one in German by J. J. I. von Döllinger. The four works were all written within the span of 14 years. Comparison of von Baer's article with the others gives a remarkable impression of the advance made by his discoveries. Burdach's treatises are now no more than historical curiosities; what little observation of human fetuses they contain is almost lost amid speculation of the Natur-Philosophie variety. Döllinger's article is pure armchair theorizing. Yet as Meyer says: "The considered conclusions of a distinguished and leading scientist regarding a natural process help to afford us an idea of the state of that science in his time."

Dr. Meyer's notes on von Baer are not intended to provide a systematic biographical memoir for readers who do not already know something of von Baer's life and work. They read like the after-dinner talk of a well informed professor with a group of advanced students, forming as it were extended footnotes upon special topics of interest. One section discusses the influence of Natur-Philosophie upon von Baer's thinking, making the point that because he was a born observer of nature he escaped quite early from the stultifying oversystematization and ratiocination of the early nineteenth century zoologists. Another section tells the little-known story of von Baer's periods of recurrent mental depression. A third lists his unclaimed and uncredited discoveries concerning the mammalian egg, ovary, and embryo. A valuable chronology of von Baer's life and work concludes the volume.

The translations of the "Commentar" and of Döllinger's "Versuch" are by Dr. Meyer himself, those of Burdach's two Latin works by graduate students of the Stanford Classics Department. All seem to be carefully done; Dr. Meyer has frankly subordinated smooth English to literal accuracy in order to preserve the exact order of thought and manner of expression of his originals. The result will be very useful to students of the history of biology who seek to know precisely what von Baer was trying to describe.

It may save readers' time to point out here two errors in the make-up of the book. The first two lines on page 84 belong at the top of page 82. The fourth paragraph on page 70 should appear immediately after the first paragraph on page 69.

GEORGE W. CORNER

T. B. LAYTON. *Sir William Arbuthnot Lane, Bt., C.B., M.S.* An Enquiry into the Mind and Influence of a Surgeon. Edinburgh and London: E. & S. Livingstone (Baltimore: Williams & Wilkins), 1956. viii + 128 pp. Ill. $4.75.

Arbuthnot Lane gave his name to Lane's Cleft Palate Needles, Lane's (bone) Plates, Lane's "no touch" technique, Lane's Kink. Due to his technical virtuosity, he was nearly fifty years ahead of his profession in his attitude towards open reduction of fractures and major resections of the colon. Surgery is the mechanical

branch of medicine and in its mechanical aspects Lane excelled. Despite early experiences with intravenous infusions he seems not to have been at his best away from the straightforward problems of operative surgery. His unfortunate preoccupation with the problem of auto-intoxication and colonic stasis, and the work of Metchnikov (whom he knew well), form a distressing chapter in his life. If it is true that it was more than thirty years after him that surgeons generally achieved his low mortality rate in colon resections, it is also true that few of Lane's patients could be said to have required their colectomies.

The book is full of tantalizingly oblique references to the history of Guy's Hospital, "the great Guy's Hospital Nursing Row," "the tragedy of Guy's," and gives a fascinating insight into the professional succession in an historic institution. The descriptions of old antiseptic techniques and hospital practices make good reading. The account of Lane's published support of Lauder Brunton's suggestion for operation on mitral stenosis, with verifying account of Dr. Lauriston Shaw that Lane had proposed such a procedure in 1890, was new to me. Shaw of course was careful to disclaim for himself any suggestion that he could favor such an operation.

Probably of all Lane's achievements his principles of open fracture reduction—even to the internal fixation of compound fractures, at which he failed and of which his biographer still categorically disapproves—remain his most lasting achievement—excepting perhaps the introduction of mineral oil for the treatment of constipation.

A surgeon, reading the life of a surgeon, cannot help wishing there were drawings and more detailed descriptions of operative maneuvers and techniques.

The author served under Lane at Guy's and his attitude is that of a faithful follower and disciple towards his revered and beloved leader.

MARK M. RAVITCH

THE AMERICAN FOUNDATION. *Medical Research: A Midcentury Survey.* Volume I, American Medical Research: in principle and practice; Volume II, Unsolved Clinical Problems: in biological perspective. Boston & Toronto: Little, Brown & Co., 1955. xxxii + 765; xxxii + 740 pp. $15.00.

These are remarkable volumes. They have been laboriously prepared by Esther Everett Lape. In them the current (1940-1955) medical research orthodoxy of the United States is interestingly documented. Inevitably these volumes will supply source material to future historians.

In the foreword, Curtis Bok explains that The American Foundation was established by his father, Edward Bok, in 1924, and that Esther Everett Lape has since directed the studies coming therefrom. Their objectives have been "to set up defenses against the lack of fact and the weight of particular propaganda that inhibit clear thinking on many important questions." The Foundation had previously tried to clarify "the principles involved in ways of distributing and paying for medical care" (*American Medicine: expert testimony out of court*, The Ameri-

can Foundation, New York, 1937, 2 volumes). In the present report it is proposed, by inference, to clarify the problem of research in biology, chemistry and physics in relation to the maintenance of high standards of medical education and of medical care for the whole population. It is believed that the best health services for individuals and communities will follow from supporting and "expanding research in medicine as a life science involving the whole field of biology and the contributions, in theory as well as in instrumentation, of chemistry, physics, mathematics."

This is surely a worthy proposition. It is one on which thousands of well qualified physicians and medical teachers and researchers are actively engaged as individuals, and also as members of professional and scientific organizations having these same objectives. Twenty-six such individuals acted as consultants in the preparation of the volumes.

The anthology of selected material has been chosen in volume I to indicate the research interests of various agencies, universities, medical schools, hospitals, federal departments, and voluntary health organizations. In volume II the choice has been with respect to trends in basic research related to the solution of nine outstanding clinical problems, cancer, infertility, tuberculosis, virus infections, rheumatic syndromes, arteriosclerosis, hypertension, alcoholism, and schizophrenia. In each volume there is a set of references indicating sources. There is, unfortunately, no index.

The key to the approach of the second volume is a discussion on current metabolic concepts. This well illustrates the amazing detail of the effort. Here is consideration of biological structure and function as aspects of molecular action, with reference to tools and theories of physics and chemistry in the study of molecular mechanisms underlying biological action and the composition of protein in relation to life. The nucleoproteins are discussed in relation to heredity, and there is much on enzymes, especially those relating to fermentation and oxidation. With a couple of pages to each topic it is astonishing to realize how much is covered.

For all of the extraordinary range of this unusual compilation it suffers from lack of historical and philosophical perspective. It is interesting to compare it with the clear and concise *Story of Living Things* (Harper's, New York), which Charles Singer wrote in 1932, and which is still pertinent. For, however much our attention is focused on the current status of medical and biological research, whatever is there current, is merely the extension of what has gone before, and can only be understood satisfactorily in regard to its past. The American Foundation volumes are in the practical American canon of how we are learning to control certain major diseases by the application of scientific information from physics, chemistry, and biology. They well reflect the current status of the American orthodoxy in biology and medicine, with some self-conscious recognition that if we really wish to maintain a solid foundation for effective medical success and the improvement of human welfare, we must support basic research in the physical and biological sciences.

CHAUNCEY D. LEAKE

THE BULLETIN RECENTLY RECEIVED *

Giovanni P. Arcieri. Sulla preservazione del corpo umano. Estratto dalla *Rivista di Storia delle Scienze Mediche e Naturali*, vol. 47, no. 1, Gennaio-Giugno 1956. 7pp. Ill.

Luis S. Granjel. *La Doctrina Antropologico-Medica de Miguel Sabuco.* Salamanca: Publicaciones del Seminario de Historia de la Medicina, Universidad de Salamanca, 1956. 81 pp.

George B. Griffenhagen and Calvin H. Hughes. The history of the mechanical heart. From *The Smithsonian Report for 1955*, pp. 339-356. Ill.

Douglas Guthrie. The three Alexander Monros and the foundation of the Edinburgh Medical School. Reprinted from *Journal of the Royal College of Surgeons of Edinburgh*, vol. 2, September 1956, pp. 24-34. Ill.

Juan B. Lastres. *Hipólito Unanue.* Lima, Peru, 1955. 224 pp. Ill.

Erna Lesky. *Arbeitsmedizin im 18. Jahrhundert.* Werksarzt und Arbeiter im Quecksilberbergwerk Idria. Wien: Verlag des Notringes der wissenschaftlichen Verbände Österreichs, 1956. 79 pp., 4 tables. Ill. A. S. 19.80.

Cesare Menini. Considerazioni storico-critiche sui risultati della terapia emotrasfusionale nel passato. Estratto da *Minerva Medica*, anno 47, vol. 1, 1956. 43 pp. Ill.

———. Storia del tic doloroso. Autopatografia di un paziente affetto da nevralgia del trigemino dal 1803 al 1824. Estratto da *Minerva Medica*, anno 47, vol. 1, 1956. 39 pp. Ill.

Achille Monti. *Antonio Scarpa in Scientific History and His Role in the Fortunes of the University of Pavia.* Translation by Frank L. Loria. New York: The Vigo Press, 1957. 125 pp. Ill. $4.50.

Michele Savonarola. *De cura languoris animi ex morbo venientis.* Introduzione storica, trascrizione et traduzione del Dott. Cesare Menini. Edito dall'Istituto di Storia della Medicina della Università di Ferrara, n. d. 93 pp.

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* The *Bulletin* reserves freedom of decision as to the publications to be listed in this section. Items received, other than those assigned for review, are ultimately incorporated into the collection of the Institute of the History of Medicine.

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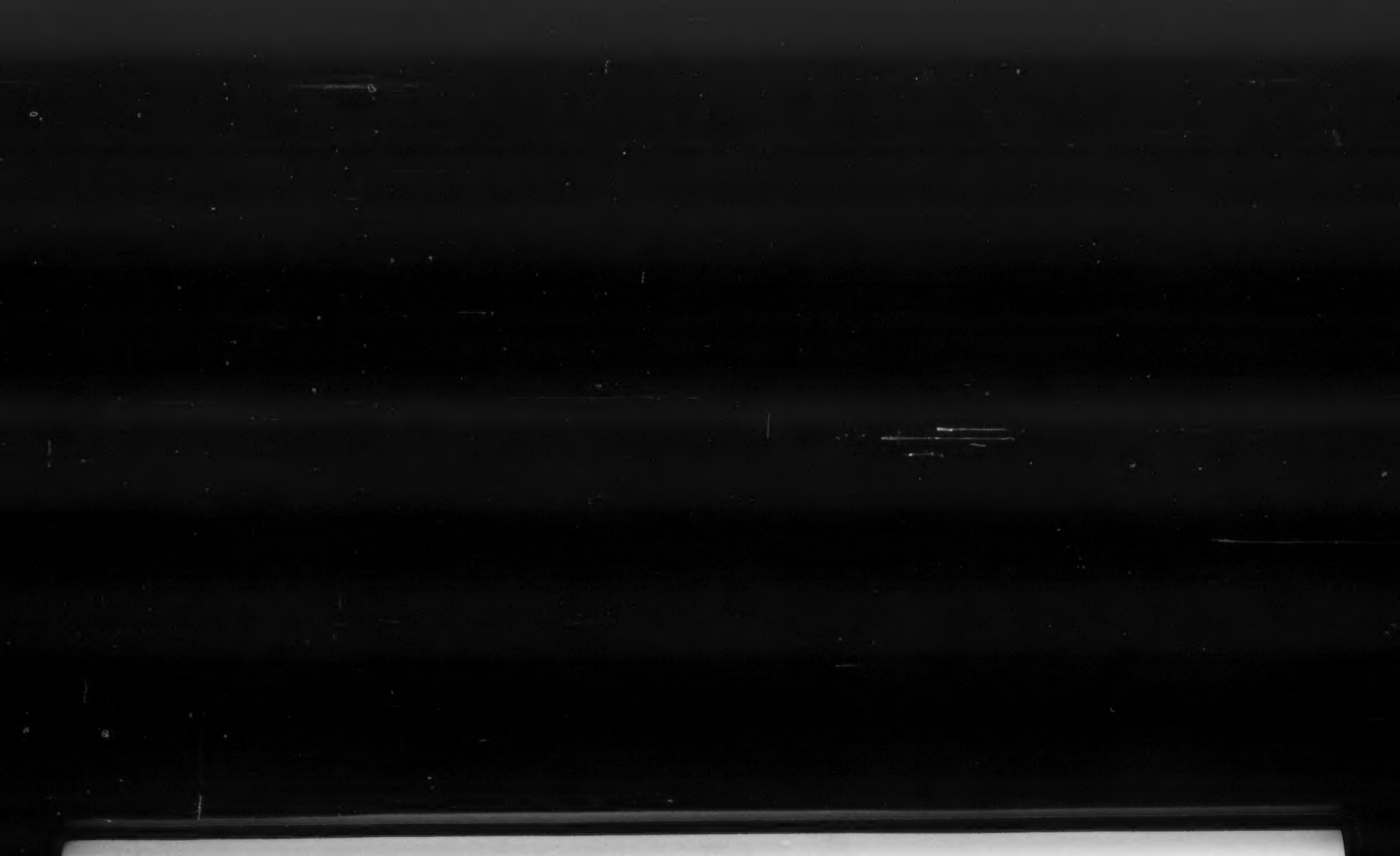
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